OPTICS & PHOTONICS International Congress

OPIC 2025

21-25 April 2025

Congress Program

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Plenary Session

Joint Sessions

Specialized International Conferences

- ALPS 2025 : The 14th Advanced Lasers and Photon Sources
- BISC 2025 : The 11th Biomedical Imaging and Sensing Conference
- FAAP 2025 : The Future of Agriculture and Advanced Photonics
- HEDS 2025 : International Conference on High Energy Density Science 2025
- ICNNQ 2025 : International Conference on Nano-photonics, Nano-optoelectronics and Quantum Technology 2025
- LSC 2025 : Conference on Laser and Synchrotron Radiation Combination Experiment 2025
- LSSE 2025 : Laser Solutions for Space and the Earth 2025
- META 2025 : Meta Photonics: Design, Fabrication, Characterization, and Applications
- OMC 2025 : The 12th Optical Manipulation and Structured Materials Conference
- OPTM 2025 : Optical Technology and Measurement for Industrial Applications Conference 2025
- OWPT 2025 : The 7th Optical Wireless and Fiber Power Transmission Conference
- SI-Thru 2025 : Sensing and Imaging through Scattering and Fluctuating Field in Biology, Telecommunication, and Astronomy
- TILA-LIC 2025 : Tiny Integrated Laser and Laser Ignition Conference 2025
- XOPT 2025 : International Conference on X-ray Optics and Applications 2025

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OPTICS & PHOTONICS International Congress 2025

Date: Monday 21 - Friday 25 April 2025

Organized by OPTICS & PHOTONICS International Council

Specialized International Conference Organized by

The Laser Society of Japan
SPIE–The International Society for Optics and Photonics (USA)
Institute of Laser Engineering, Osaka University
Institute for Nano Quantum Electronics, The University of Tokyo
RIKEN SPring-8 Center
Technical Committee for Ultraprecision Machining of The Japan Society for Precision Engineering
Micro Solid-State Photonics Association
Photonics division, The Japan Society of Applied Physics
Executive Committee of "The Future of Agriculture and Advanced Photonics"
The executive committee of Laser Solution for Space and the Earth
City University of Hong Kong
RIKEN Center for Advanced Photonics
Transformative Research Areas "Revolution of Chiral Materials Science using Helical Light Fields"
Technical Committee for Mechano-photonics, The Japan Society for Precision Engineering
Study Group of Optical Wireless Power Transmission
Research Center for Precision Engineering, Osaka University

Supported by

Ministry of Agriculture, Forestry and Fisheries
Ministry of Economy, Trade and Industry
Ministry of Education, Culture, Sports, Science and Technology
Ministry of Health, Labor and Welfare
Ministry of Land, Infrastructure, Transport and Tourism
Japan Tourism Agency, Ministry of Land, Infrastructure, Transport and Tourism
JST–Japan Science and Technology Agency
Keidanren
NEDO–New Energy and Industrial Technology Development Organization

In cooperation with

AIST–National Institute of Advanced Industrial Science and Technology
AESJ–Atomic Energy Society of Japan
QST–National Institutes for Quantum and Radiological Science and Technology
RIKEN
JSPF–The Japan Society of Plasma Science and Nuclear Fusion Research
OITDA–Optoelectronics Industry and Technology Development Association
OSJ–The Optical Society of Japan
JPC–Japan Photonics Council
Institute for Laser Technology
Fraunhofer Institute for Laser Technology ILT (Germany)
OPTICA (USA)
PIDA–Photonics Industry & Technology Development Association (Taiwan)
Photonics Media (USA)
SPIE–The International Society for Optics and Photonics (USA)
The Optronics Co., Ltd

Welcome to OPIC 2025

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Chair
OPIC 2025 Organizing Committee
Professor Emeritus, Keio University

Osamu Matoba
Chair
OPIC 2025 Steering Committee
Professor, Kobe University

The International Optics and Photonics Council (OPI Council) has held The Optics and Photonics International Congress (OPIC) and the International Optics and Photonics Exhibition (OPIE) at Pacifico Yokohama every year since 2012. OPIC hosts more than 10 specialized international conferences (SICs) every year, and new SICs are added every year, with the number of papers presented and the number of participants increasing year by year. In the extensive research and development of optics and photonics, it is important that various application developments come together and exchange information with each other, centered on common core technologies such as optical materials including nonlinear optics, laser light sources, optical detection, and active optical control. The main purpose of OPIC is to support the development of new academic and applied fields by providing an efficient platform to support the holding of SICs for the exchange of information between researchers and promoting the development of emerging research. Since its establishment in 2012, OPIC has successfully achieved its purpose, growing into a large international conference.

This year marks the 100th anniversary of the first achievements in quantum mechanics by Werner Heisenberg, Max Born, and Jordan Pascual. Recognizing this important milestone and the continued growth and importance of quantum science, UNESCO has declared 2025 the International Year of Quantum Science and Technology (IYQ). OPIC 2025 will be one of the first international conferences on quantum science to be held in 2025. The plenary sessions will feature advanced and state-of-the-art applications of quantum science and technology.

The organizers would like to thank all those who submitted papers and the invited speakers. We have made every effort to ensure that the conference is beneficial for all participants. We hope that OPIC 2025 will be a fruitful one, and that communication between researchers will be strengthened.

Program at a Glance

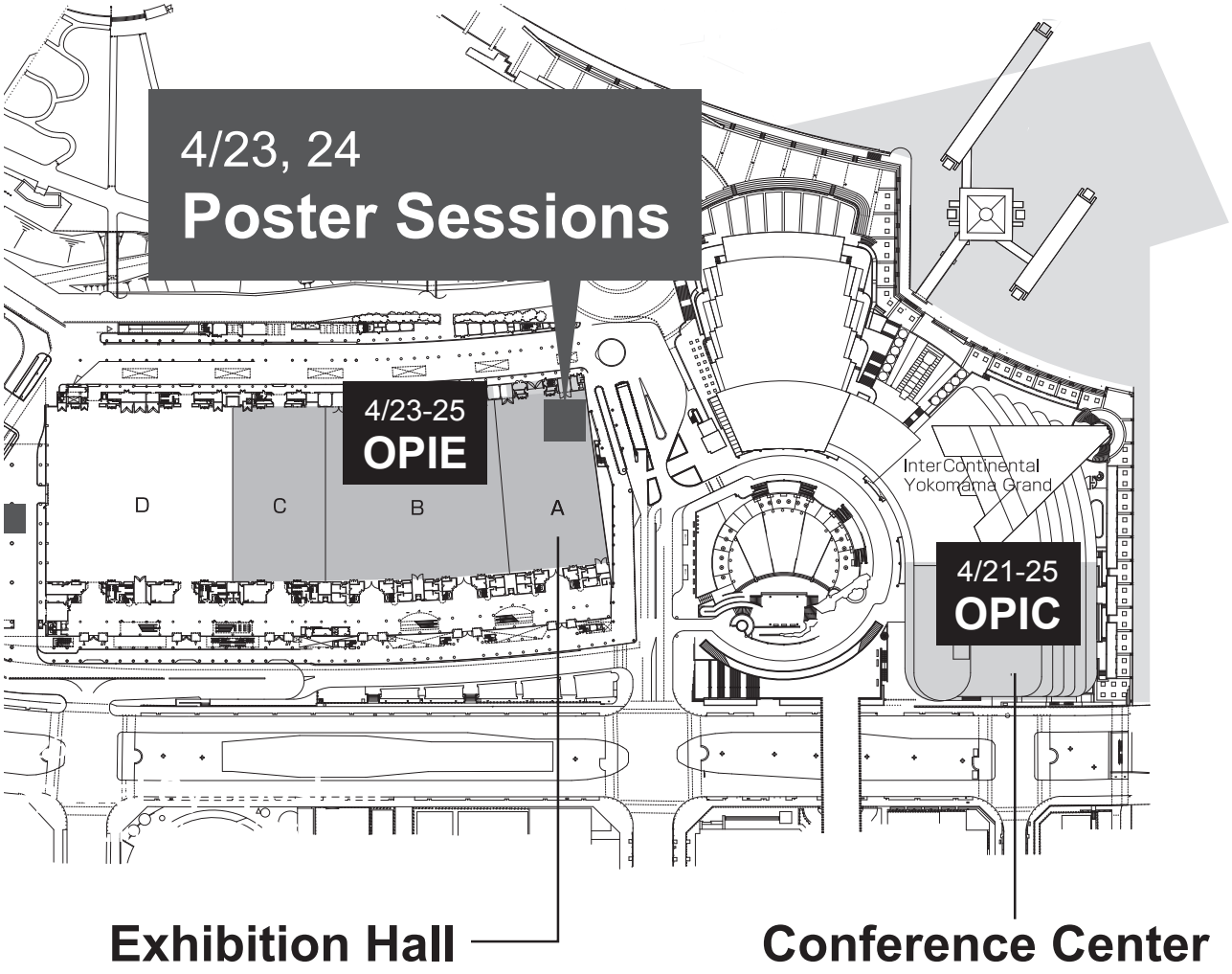
Date	Time	HEDS Room 311+312	XOPT Room 313+314	ALPS Room 303	ALPS Room 511+512	ALPS Room 413	BISC Room 419	SI-Thru Room 419	ICNNQ Room 414+415
Mon 21 Apr.	10:00-			Opening Remarks (p.40)					Opening Remarks (p.40)
	11:00-			ALPS-C1 (p.40-)	ALPS-A1 (p.40-)				ICNNQ1 (p.40)
	12:00-			Lunch					Lunch
	13:00-			ALPS-C2 (p.42-)	ALPS-A2 (p.42-)	ALPS-J1 (p.42-)		SI-Thru1 (p.43-)	ICNNQ2 (p.43-)
	14:00-				Break				
	15:00-			ALPS-C3 (p.44-)	ALPS-A3 (p.44-)	ALPS-J2 (p.44-)		Break	
	16:00-							SI-Thru2 (p.47)	ICNNQ3 (p.47)
	17:00-								
	17:30-	17:30-19:00 Welcome Reception <Bay Bridge Cafeteria (Conference Center 6F)> (p.11)							
Tue 22 Apr.	9:00-	Opening Remarks (p.49) HEDS1 (p.49-)	Opening Remarks (p.50) XOPT1 (p.50)	ALPS-C4 (p.48)		ALPS-J3 (p.48-)		SI-Thru3 (p.50-)	ICNNQ4 (p.49-)
	10:00-	Break		Break	ALPS-A4 (p.52)	Break		Break	Break
	11:00-	HEDS2 (p.53-)	Break XOPT2 (p.54-)	ALPS-B1 (p.52-)		ALPS-F1 (p.52-)		SI-Thru4 (p.54)	ICNNQ5 (p.53-)
	12:00-	Lunch						Lunch	
	13:00-			ALPS-D1 (p.56-)	ALPS-A5 (p.56-)	ALPS-F2 (p.60)			
	14:00-	HEDS3 (p.61-)	XOPT3 (p.58-)	Break ALPS-D2 (p.60-)				SI-Thru5 (p.58-)	ICNNQ6 (p.61-)
	15:00-	Break						Break	
	16:00-	Joint Session ALPS & HEDS & XOPT <Room 303> (p.68)						SI-Thru6 (p.66)	ICNNQ7 (p.65-)
	17:30-	17:30-19:30 Student Reception <PIZZA-LA (Exhibition Hall 2F)> (p.11)							
Wed 23 Apr.	9:00-	HEDS4 (p.70-)	XOPT4 (p.72-)	ALPS-D3 (p.70-)	ALPS-I1 (p.70-)		BISC1 (p.70)		
	10:00-		Break				Break		
	11:00-	Break HEDS5 (p.78-)	XOPT5 (p.76-)	ALPSp1 (p.74-)			Joint Session BISC & SI-Thru <Room 419> (p.74-)		ICNNQp (p.75-)
	12:00-	Lunch						Lunch	
	13:00-			ALPS-D4 (p.82)	ALPS-I2 (p.82)				ICNNQ8 (p.83-)
	14:00-	HEDS6 (p.82-)	XOPTp (p.85-)	Break			BISC2 (p.82-)	SI-Thrup (p.84-)	
	15:00-	Break HEDS7 (p.90)		ALPS-D5 (p.86-)	ALPS-I3 (p.86-)				
	16:15-	16:15-18:45 Plenary Session <Room 501+502> (p.15)							
	19:15-	19:15-21:15 Banquet <Ballroom (InterContinental 3F)> (p.11)							
Thu 24 Apr.	9:00-	HEDS8 (p.94) HEDS9 (p.95-)	XOPT6 (p.96)	ALPS-I4 (p.94-)	ALPS-G1 (p.94-)		BISC3 (p.94-)		
	10:00-			Break			Break		
	11:00-	HEDS10 (p.98-)	XOPT7 (p.100) XOPT8 (p.104)	ALPSp2 (p.98-)			BISC4 (p.98-)		
	12:00-		Lunch				Lunch		
	13:00-								
	14:00-	HEDSp (p.106-)	XOPT9 (p.108)	ALPS-I5 (p.106-)	ALPS-G2 (p.106-)		BISCp (p.106-)		
	15:00-		Break XOPT10 (p.112)	Break			Break		
	16:00-		Closing Remarks (p.116)	ALPS-I6 (p.110-)	ALPS-G3 (p.110-)		BISC5 (p.110-)		
Fri 25 Apr.	9:00-	HEDS11 (p.118)					BISC6 (p.118-)		
	10:00-	HEDS12 (p.118-)			ALPS-H1 (p.118-)				
	11:00-	Break HEDS13 (p.122-)		ALPS-E1 (p.122-)	Break ALPS-H2 (p.126)		Break BISC7 (p.126)		
	12:00-	Closing Remarks (p.126)		Lunch			Lunch		
	13:00-								
	14:00-			ALPS-E2 (p.128-)			BISC8 (p.128-)		
	15:00-			Break Closing Remarks (p.130)			Break		
	16:00-						BISC9 (p.130-)		

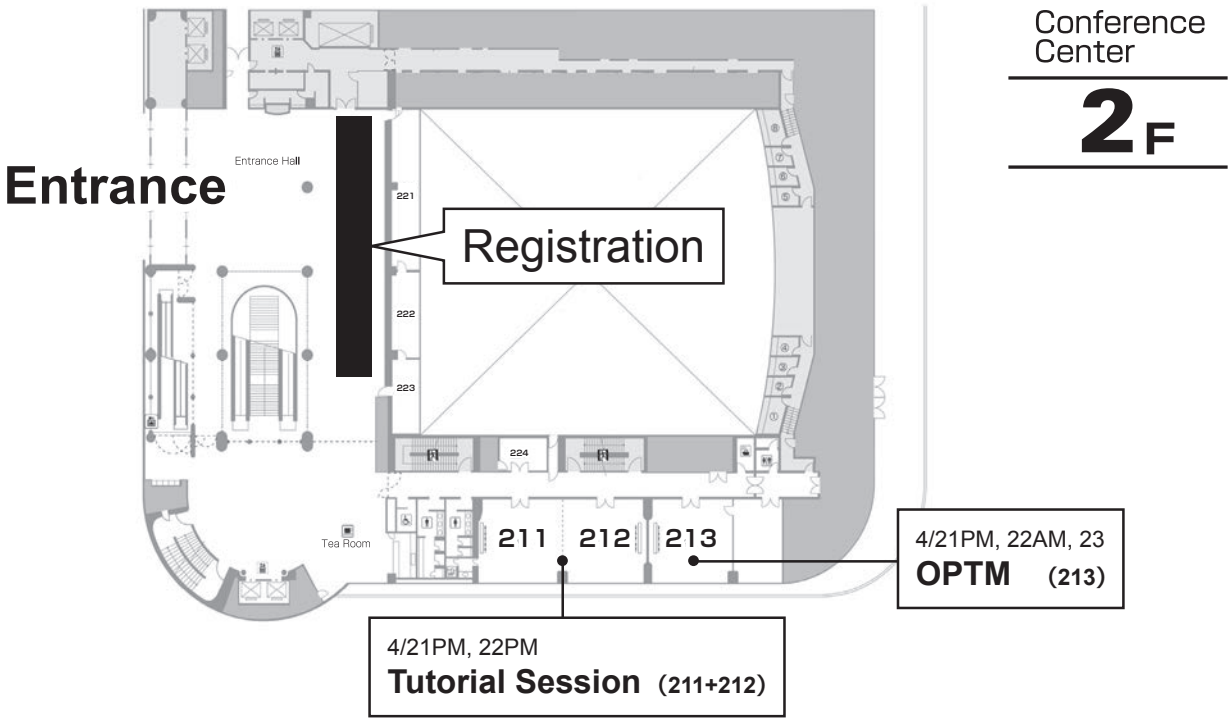
Plenary Joint Poster

LSC Room 421	FAAP Room 412	LSSE Room 412	META Room 411	OMC Room 418	OPTM Room 213	OWPT Room 416+417	TILA-LIC Room 315	Tutorial Room 211+212	Room / Time
									10:00-
									11:00-
									12:00-
	FAAP1 (p.42-)				Opening Remarks (p.43)			Tutorial Session I	13:00-
					OPTM1 (p.43-)				14:00-
					Break				15:00-
		LSSE1 (p.47)			OPTM2 (p.47)				16:00-
									17:00-
17:30-19:00 Welcome Reception <Bay Bridge Cafeteria (Conference Center 6F)> (p.11)									17:30-
				OMC1 (p.49-)	OPTM3 (p.49-)				9:00-
	FAAP2 (p.52-)			Break					10:00-
				OMC2 (p.53-)	OPTM4 (p.53-)				11:00-
	Lunch			Lunch					12:00-
	FAAP3 (p.53-)			OMC3 (p.57-)		OWPT1 (p.62-)		Tutorial Session II	13:00-
						Break			14:00-
		LSSE2 (p.69)				OWPT2 (p.66)			15:00-
									16:00-
17:30-19:30 Student Reception <PIZZA-LA (Exhibition Hall 2F)> (p.11)									17:30-
			META1 (p.71-)	OMC4 (p.71-)	OPTM5 (p.72-)	OWPT3 (p.72-)	TILA-LIC1 (p.72-)		9:00-
		LSSE3 (p.75-)		Break					10:00-
			META2 (p.75-)	OMC5 (p.75-)	OPTM6 (p.76-)	OWPT4 (p.76-)	TILA-LIC2 (p.76)		11:00-
		Lunch							12:00-
									13:00-
LSC1 (p.83-)		LSSE4 (p.83-)	META3 (p.83-)	OMC6 (p.84-)	OPTM7 (p.84)	OWPT5 (p.84-)	TILA-LICp (p.85-)		14:00-
Break			Break		Break				
LSC2 (p.87-)			META4 (p.87-)		OPTM8 (p.88-)		TILA-LIC3 (p.89)		15:00-
16:15-18:45 Plenary Session <Room 501+502> (p.15)									16:15-
19:15-21:15 Banquet <Ballroom (InterContinental 3F)> (p.11)									19:15-
LSC3 (p.95-)			META5 (p.95-)	OMC7 (p.95-)		OWPT6 (p.96-)	TILA-LIC4 (p.96-)		9:00-
Break		LSSE5 (p.99-)	Break			Break			10:00-
LSC4 (p.99-)			META6 (p.99-)	OMC8 (p.99-)	OPTMp (p.100-)	OWPT7 (p.100-)	TILA-LIC5 (p.100)		11:00-
Lunch			Lunch			Lunch			12:00-
		LSSE6 (p.107-)	META7 (p.107-)	OMCp (p.107-)		OWPTp (p.108-)	TILA-LIC6 (p.108-)		13:00-
LSC5 (p.107-)									14:00-
Break		Break		OMC9 (p.111-)			Break		15:00-
LSC6 (p.111-)		LSSE7 (p.111-)	META8 (p.111-)				TILA-LIC7 (p.112-)		16:00-
LSC7 (p.119-)				OMC10 (p.119-)		OWPT8 (p.119-)	TILA-LIC8 (p.120)		9:00-
Break	FAAP4 (p.123-)			Break		Break			10:00-
LSC8 (p.123-)				OMC11 (p.123-)		OWPT9 (p.127)	TILA-LIC9 (p.124)		11:00-
	Lunch			Lunch			Lunch		12:00-
	FAAP5 (p.128)			OMC12 (p.128-)			TILA-LIC10 (p.129-)		13:00-
	Break						Break		14:00-
	FAAP6 (p.132)						TILA-LIC11 (p.133)		15:00-
									16:00-

Floor Plan

Pacifico Yokohama




Conference Center
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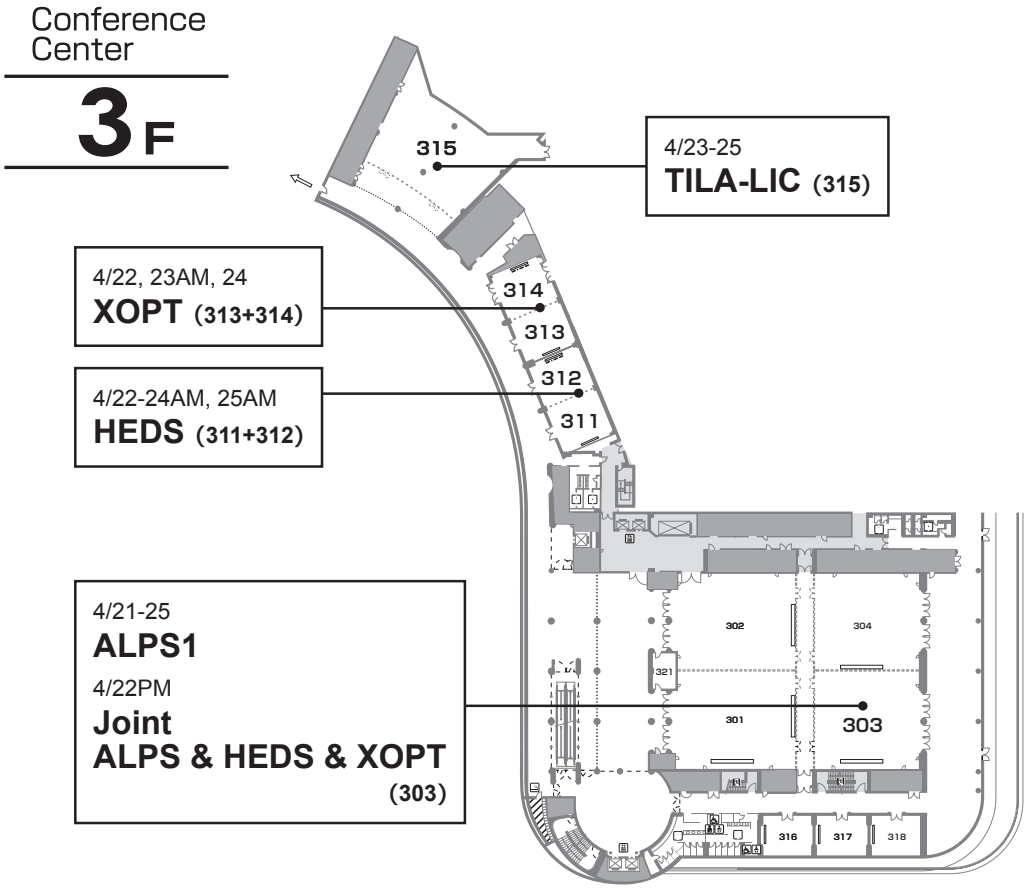
Tutorial Session (211+212)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Joint
ALPS & HEDS & XOPT
(303)
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Conference Center

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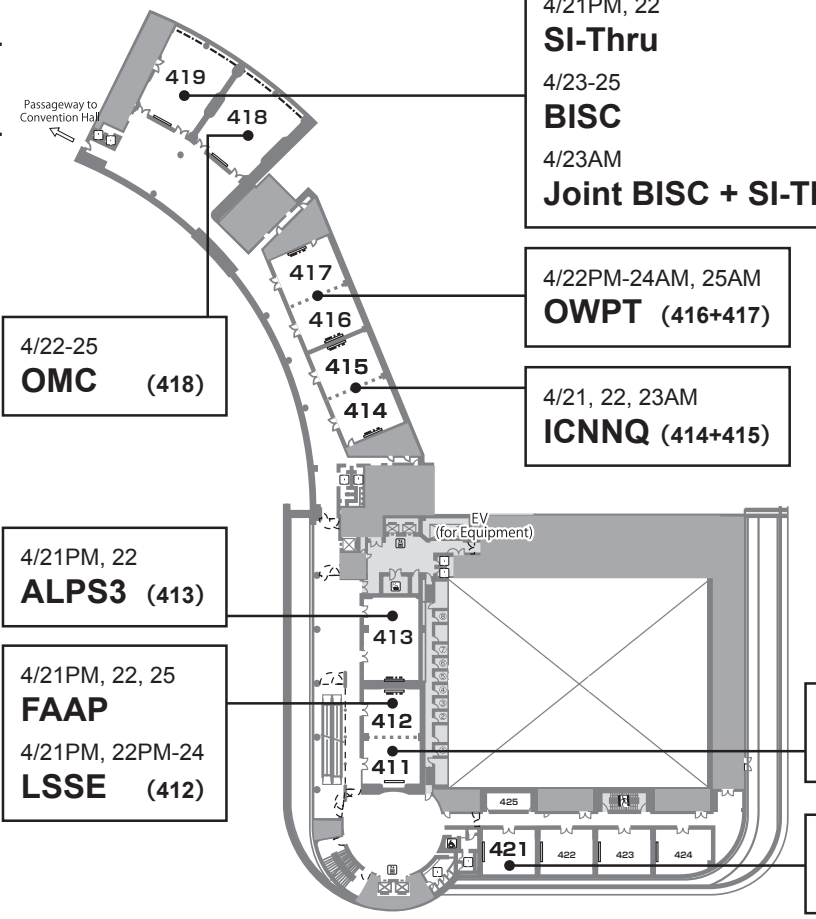

4/21PM, 22
SI-Thru
4/23-25
BISC
4/23AM
Joint BISC + SI-Thru (419)

4/22PM-24AM, 25AM
OWPT (416+417)

4/22-25
OMC (418)

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META (411)

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Conference Center

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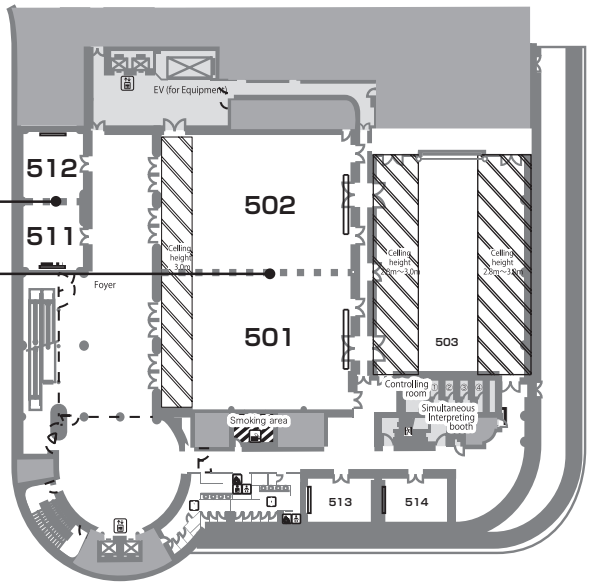

4/21-25AM
ALPS2 (511+512)

4/23 16:15-18:45
Plenary Session
(501+502)

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Schedule-at-a-Glance

	Monday 21 April	Tuesday 22 April	Wednesday 23 April	Thursday 24 April	Friday 25 April
GENERAL					
Registration	8:00-16:30	8:00-16:30	8:00-16:30	8:00-16:30	8:00-14:00
Coffee Breaks	15:00-15:30	10:30-11:00 15:00-15:30	10:30-11:00 14:45-15:15	10:30-11:00 15:00-15:30	10:30-11:00 15:00-15:30
Social Networking Events <*1 Conference Center 6F> <*2 Exhibition Hall 2F> <*3 InterContinental 3F>	Welcome Reception 17:30-19:30 Bay Bridge Cafeteria[*1]	Student Reception 17:30-19:30 PIZZA-LA[*2]	Banquet 19:15-21:15 Ballroom[*3]		
OPIC Technical Programing					
Technical Sessions	9:50-17:30	9:00-17:00	9:00-16:00	9:00-17:20	9:00-17:00
Tutorial <Room 211+212>	13:00-17:45	13:00-17:45			
Plenary Session <Room 501+502>			16:15-18:45		
Joint Session ALPS & HEDS & XOPT <Room 303> BISC & SI-Thru <Room 419>		15:30-17:00	10:30-12:30		
Poster Sessions <Exhibition Hall A>			10:30-12:00 13:30-15:00	10:30-12:00 13:30-15:00	
OPIE AND SHOW FLOOR ACTIVITIES					
OPIE <Exhibition Hall A,B>			10:00-17:00	10:00-17:00	10:00-17:00
Poster Session Lunch <Exhibition Hall A>			12:00-12:45	12:00-12:45	
Poster Session Dessert <Exhibition Hall A>			14:45-15:15	14:45-15:15	

General Information

Registration

Pacifico Yokohama, Conference Center 2F Lobby

Registration Hours	
Monday, 21 April	8:00 - 16:30
Tuesday, 22 April	8:00 - 16:30
Wednesday, 23 April	8:00 - 16:30
Thursday, 24 April	8:00 - 16:30
Friday, 25 April	8:00 - 14:00

Exhibition

Exhibition Hall A,B,C

OPIE '25 (Exhibition) is open to all registered attendees. Schedule plenty of time to roam the halls, visit with the hundreds of companies represented and see the latest products and technologies. For more information about what's happening on the exhibit floor, see pages 150-151.

Exhibition Hours	
Wednesday, 23 April	10:00 - 17:00
Thursday, 24 April	10:00 - 17:00
Friday, 25 April	10:00 - 17:00

Conference Information Desk

The Conference Information Desk is for any information concerning the OPIC conferences. Staff will be equipped to help you understand the program book, find room locations, and accept small Lost and Found items, and will operate during registration hours.

Free High-Speed Wireless LAN (Wi-Fi)

How to connect to Wi-Fi

Go to Settings > Wi-Fi on your mobile
and tap join SSID: FREE-PACIFICO

Lost/Found Items

Central Disaster Control Center

Report a lost/found item to the Central Disaster Control Center.

Exhibition Hall B1F

TEL: +81-45-221-2127 (24 hours open)

Business Center

Kinko's (Business Center)

Conference Center 1F and Exhibition Hall 2F

Open Hours 9:00 - 18:00 (except 21 April)

Services : Printing (Digital/Offset), Copying machines, FAX machines, Scanning

TEL: +81-45-222-7025

ATM

7-Eleven (7:00 to 21:00)

Exhibition Hall 2F

With Seven Bank ATM, displaying 12 languages, you can withdraw Japanese yen from cash cards and credit cards issued overseas. Tax-free services are available.

Daily YAMAZAKI (7:00 to 23:00)

Exhibition Hall 1F

With E-Net ATM, you can withdraw Japanese yen.

Foreign Exchange

There is a foreign currency exchange machine on the 2nd floor of the InterContinental Yokohama Grand.

First Aid Room

Conference Center 1F and Exhibition Hall 1F

Equipment: Wheelchairs, beds, AED, stretchers

Dial 119 in case of an accident or a medical emergency.

AED (Automated External Defibrillator)

An AED is used to treat ventricular fibrillation.

AEDs are available in the following locations.

Conference Center: In front of First Aid Room (1F)

Exhibition Hall: In front of First Aid Room (1F) and at Security Office (B1F)

Coin Lockers

Conference Center	Size	Price / day
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OPIC 2025 Plenary Session

Pacifico Yokohama Conference Center, Room 501+502
Wednesday 23 April, 16:15 - 18:45

16:15 - 17:05

Chair: Yoshiaki Kato, *Chair of OPIC 2025 International Advisory Board, Professor Emeritus of Osaka University, Japan*

Shiro Yamakawa, *Project Manager, JDRS Project team, Space Technology Directorate I, Japan Aerospace Exploration Agency (JAXA), Japan*

"LASERs in Space: LASER Utilization in Space Programs and Recent Topics on the Optical Data Relay Satellite in JAXA"

17:05 - 17:55

Chair: Fumihiko Kannari, *Chair of OPIC 2025 Organizing Committee, Professor Emeritus of Keio University, Japan*

Kenji Ohmori, *Institute for Molecular Science (IMS), National Institutes of Natural Sciences, Japan*

"Ultrafast Quantum Computing with Ultracold Atom Arrays at Quantum Speed Limit"

17:55 - 18:45

Chair: Shuji Sakabe, *Congress Chair of OPIC 2025, Professor Emeritus of Kyoto University, Japan*

R. J. Dwayne Miller, *Departments of Chemistry and Physics, University of Toronto, Canada*

"What is Life? Towards Imaging the Molecular Machinery of the Cell"

Plenary Session

Plenary Speech

LASERs in Space : LASER utilization in space programs and recent topics on the optical data relay satellite in JAXA

YAMAKAWA Shiro, Ph. D.
Project Manager,
JDRS Project team, Space Technology Directorate I,
Japan Aerospace Exploration Agency (JAXA)
yamakawa.shiro@jaxa.jp

Abstract

Laser technology and outer-space exploration activities were born at almost the same time. Since then, space exploration and development have been supported by the fruits of advancement in laser science and technologies.

In this presentation, the author briefly introduces several programs and activities which utilize LASER technologies in Japanese national space agency, JAXA. And as one of the significant achievements of JAXA's laser-related satellite development programs, in-orbit demonstrations of the optical data-relay satellite system (LUCAS) are reported. 1.8Gbps free space laser communication links are successfully established between two satellites which are located about 42,000 km apart and high resolution remote-sensing data acquired by one satellite is downlinked through the other satellite, i.e. the optical data relay satellite, rapidly. The free space laser communication technology established through the development of LUCAS is expected to contribute to advance in high-rate space communication network.

Content

1. Laser in space

Laser and its application are indispensable technologies for space activities. Besides the industrial fundamental technologies such as laser processing or laser machining, its straightness, coherence and monochromatic feature are widely used in many space missions. Laser ranging has been utilized since the down of the space development age. In fact, in the Apollo program of NASA, an Apollo explore brought laser reflectors to the surface of the Moon and irradiating them with laser beams from the ground led precious measurement of the distance between the Moon and the Earth. That made accurate determination of the orbit of the moon possible. Laser ranging is widely used in space up to the present from orbit determination of satellite to rendezvous of two spacecrafts. JAXA's cargo transport spacecrafts, HTV, which supply the essential materials to the International Space Station (ISS), use LIDAR sensor when approaching and trying to dock with the ISS. Short-range LIDARs also play an important role in asteroid exploration mission, "Hayabusa" and its succeeding explorer "Hayabusa-2." These explorers estimated the distance to the "target" asteroids with on-board LIDAR and the LIDARs contributed the success of these innovative missions, sample return from asteroids.

Another important on-board LIDAR application is found in "mission to the earth" i.e. remote-sensing sensor in earth observation programs. In this case, LIDAR on a spacecraft irradiate laser beam to target (surface or the atmosphere) of the Earth. The reflected light from the target is collected with a telescope on the spacecraft and information regarding the target can be obtained through detection of the reflected light. In JAXA, we have two programs which utilize space LIDARs. Their aims are precious measurement of altitude of grand and tree-biomass.

2. Space laser communication and LUCAS

Expanding use of space in recent years demands high-data rate communication as a space infrastructure. Laser free-space communication is key technology for realization of high-data rates (Gbps-class) transmission with small-size onboard communication terminals. In addition, users can enjoy low interference characteristics

with other communication or RF systems under radio license-free conditions. Not only government space agencies but also commercial companies and military organizations worldwide are eager to acquire space laser communication technology these days. But technical difficulties, especially keeping pointed and tracking narrow laser beam, have prevented practical use of inter-orbit laser communication.

JAXA has devoted considerable efforts to realize space laser communication since the 1990's. JAXA develops and operates earth observation (EO) satellites and needs to down-link their acquired observation data which are increasing rapidly in keeping with the advance in the resolution of sensors. In order to meet these needs to high-speed communication data link, JAXA decided to develop and to introduce a new data relay satellite system, "LUCAS" which has capability to provide both high speed and wide communication area for links between EO satellites and ground.

LUCAS (Fig.1), an optical data relay satellite system, consists of a geostationary orbit (GEO) satellite with laser inter-satellite link capability with spacecrafts in low earth orbit (LEO), an RF feeder link to ground stations, and two ground stations. More than seven times higher speed communication is achievable with the laser inter-satellite link as compared to RF inter-satellite link, which was adopted in JAXA's former date relay satellite, "Kodama." The development of LUCAS system started in 2015, The data relay satellite, equipped with an optical link terminal of LUCAS, was launched in November 2020.

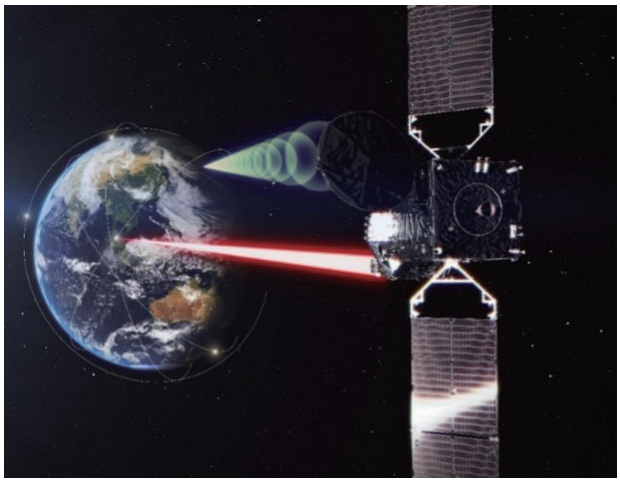


Figure 1. On-orbit artists' image of LUCAS in orbit

In September 2024, after the launch of the first LUCAS user EO satellite, "Daichi-4"(ALOS-4,) we have successfully conducted in-orbit technology demonstrations of LUCAS. The user data rate of 1.8Gbps is the world's fastest in GEO-LEO optical communication in the 1.5μm band. The results of quick evaluations confirm that the system is performing as expected. The outlook is bright for the goal of providing actual operation to ALOS-4 after July 2025..

YAMAKAWA Shiro was born in Tokyo, Japan in 1969. He received the B.S., M.S., and Ph. D. degrees from Keio University in 1992, 1994, 1998, respectively. From 1997, He has worked for National Space Development Agency and Japan Aerospace Exploration Agency, where he conducted research and development in the field of satellite and its applications. Now he is the project manager of JAXA's JDRS project team.

Plenary Speech

Ultrafast quantum computing with ultracold atom arrays at quantum speed limit

Kenji Ohmori
Institute for Molecular Science (IMS),
National Institutes of Natural Sciences,
Myodaiji, Okazaki 444-8585, Japan
ohmori@ims.ac.jp

Abstract

Cold-atom (or neutral-atom) quantum computers use the arrays of ultracold atoms assembled with optical tweezers, in which each single atom serves as a high-quality qubit, whereas the whole system operates at room temperatures. In particular, the "ultrafast quantum computer" that we are developing is based on a completely new idea where ultrafast laser technology is successfully combined with quantum computing.

In this ultrafast quantum computing, we have recently succeeded in accelerating the conditional two-qubit gate of cold-atom quantum computers by two orders of magnitude. It is also two or more orders of magnitude faster than the noise from the external environment and operating lasers. This disruptive progress has been made possible not only by the ultrafast laser technologies, but also by our ultra-precise optical tweezers array and high-NA microscope technologies.

Kenji Ohmori is a Chair Professor at the Institute for Molecular Science (IMS), National Institutes of Natural Sciences, Japan. After receiving his Ph.D. from The University of Tokyo in 1992, he was a Research Associate and an Associate Professor at Tohoku University. In 2003 he was appointed a Full Professor at IMS. Professor Ohmori is currently leading large-scale / long-term national projects on the development of ultrafast quantum simulators and quantum computers (2018-2030) generously supported with priority by the Ministry of Education, Kenji Ohmori is a Chair Professor at the Institute for Molecular Science (IMS), National Institutes of Natural Sciences, Japan. After receiving his Ph.D. from The University of Tokyo in 1992, he was a Research Associate and an Associate Professor at Tohoku University. In 2003 he was appointed a Full Professor at IMS. Professor Ohmori is currently leading large-scale / long-term national projects on the development of ultrafast quantum simulators and quantum computers (2018-2030) generously supported with priority by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) and Cabinet Office of the government of Japan, expected as one of the front runners in quantum technologies.He has been celebrated with many honors. Highlights include the Japan Academy Medal (2007), Fellow of the American Physical Society (2009), Humboldt Research Award from the government of Germany (2012), Commendation for Science and Technology by the Minister of MEXT (2018), and the Medal with Purple Ribbon by His Majesty the Emperor of Japan for his achievements on quantum physics (2021). The Medal with Purple Ribbon is awarded for inventions and discoveries in science and technology, and for outstanding achievements in the fields of science, sports, art and culture. He is currently serving as the Chair of the Committee for Quantum Science and Technology Policy, MEXT, Japan since 2023, after serving as the Vice Chair of the same committee from 2015-2022. It was officially announced in February 2024 that Professor Ohmori and his team established the "Commercialization Preparatory Platform" for their "cold (neutral) atom" quantum computer:

https://www.prnewswire.com/news-releases/ims-developing-japans-first-cold-neutral-atom-quantum-computers-new-collaboration-with-10-industry-partners-toward-commercialization-302086161.html

where 13 topnotch industries have joined, including Development Bank of Japan Inc., Hitachi, Ltd., Fujitsu Limited, NEC Corporation, and Hamamatsu Photonics

K.K. The relevant start-up company will be launched within the Japanese Fiscal Year 2024.

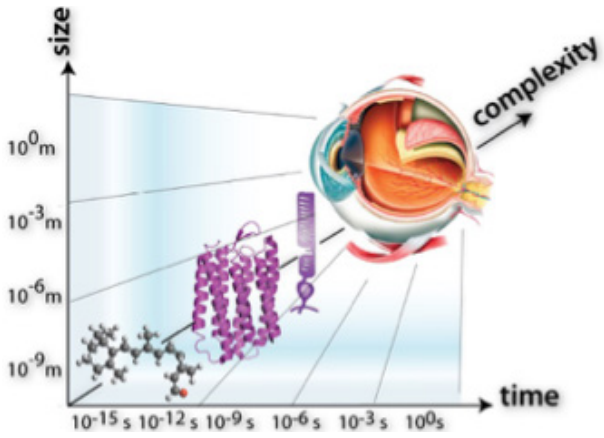
Plenary Speech

What is Life? Towards Imaging the Molecular Machinery of the Cell

R. J. Dwayne Miller
Departments of Chemistry and Physics,
University of Toronto,
Toronto Canada
dmiller@lphys2.chem.utoronto.ca

Abstract.

The posed quintessential question is not cast as an origins of life issue here but rather directed towards understanding the underlying physics by which chemistry breathes life into otherwise inanimate matter. The real issue is how chemistry scales in complexity up to the level of biological systems. For even relatively small molecules (e.g., 10 to 100 atoms), there are an enormous number of possible nuclear configurations that could propagate the system from one molecular form to another during a chemical event. Chemistry is inherently a high dimensional problem of order 3N (N= number of atoms) and highly nonlinear in sampling rates for different reaction trajectories. To explain the observed time scales for chemistry and biological processes, there must be an enormous reduction in dimensionality at the barrier crossing region, controlling the kinetics, in which a few key modes direct the chemistry – irrespective of complexity. The challenge is to try to unearth these motions and to understand a priori which motions are directing the chemistry and thereby biological functions. With the recent advent of ultrabright electron sources using femtosecond laser photoinjection, it is now possible to directly observe the atomic motions involved to complete the picture. Based on model systems, a simple concept is introduced to understand the spatially correlated forces leading to generalized reaction mechanisms, which makes chemistry a transferrable concept. Several atomically resolved molecular movies will be presented to dramatically show this effect and the concept of key reaction modes. The problem is much more challenging within cells where the number of possible interactions becomes truly astronomical, as will be discussed. The lessons learned above give hope to find similar dynamically coupled spatial correlations, but these will be related to free energy gradients that arise within intracellular architecture. New technologies, based on the space charge limits mastered in ultrabright electron source development, will dramatically improve ion collection for laser based spatial imaging mass spectrometry that will enable us to look inside the cell to directly observe the driving forces for living systems, i.e., to quantify life. This prospect promises to fill in the gaps between genetic information and protein expression, from the blue print to the actual execution of the code. The light matter interactions being exploited and technological requirements under development to achieve this Moon Shot for Biology will be discussed as part of proposal for a strategic initiative to map the cell.



R. J. Dwayne Miller has published over 300 papers, notably contributions leading to the development of ultrabright electron sources to light up atomic motions. His group were the first to achieve the long-held goal to watch atomic motions during the defining moments of chemistry and have attained the fundamental space-time limit to imaging chemistry. His research accomplishments have been recognized with numerous awards including the National Science Foundation Presidential Young Investigator Award (USA), Sloan

Fellowship, Guggenheim Fellow, Dreyfus Award, Polanyi Award, Royal Society of Canada (RSC) Rutherford Medal, Chemical Institute of Canada (CIC) Medal, American Chemical Society (ACS) E. Bright Wilson Award, and most recently the European Physical Society (EPS) Award in Laser Science for "Achieving the Fundamental Limit to Min. Invasive Surgery with Complete Biodiagnostics". The enabling physics came from the first atomic movies on strongly driven phase transitions to determine the parameters for completely uniform forces for material removal without shock wave formation. These latter concepts are now going to clinical trials with the promise of enabling scar free surgery with broad medical applications. He is also a strong advocate for science promotion earning the RSC McNeil Medal (2011) and the Helen M. Free Award of the ACS for founding Science Rendezvous, now in its 18th year, aimed to make science accessible to the general public, including remote northern communities, with over 200,000 attendees (preCOVID) and >6000 volunteers annually. He is a Fellow of the CIC, OSA, RSC, RSC (Chemistry, UK) and was inducted as a Fellow of the Royal Society in 2023. He will receive the 2025 Earl K Plyler Prize For Molecular Spectroscopy and Dynamics from the American Physical Society (APS) for his work on imaging atomic motions, capturing chemistry in action.

NOTE

OPIC 2025

Specialized International Conferences

Conference Chairs' Welcome Letters & Committees

The 14th Advanced Lasers and Photon Sources Conference ALPS 2025

Sponsored by
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Conference Co-Chair
Hitoki Yoneda
Institute for Laser Science, University of Electro-Communications

Conference Co-Chair
Ruxin Li
Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, China

We are pleased to welcome you to the 14th Advanced Laser and Photon Sources Conference (ALPS 2025).

The ALPS conference covers the science and technology of lasers and photon sources, spanning fundamental research to industrial applications. As widely recognized, the development of high-quality light sources is essential for advancing scientific discoveries and driving new industrial applications. At ALPS, participants will have the opportunity to exchange ideas and insights on groundbreaking technological advancements.

Additionally, the conference will explore emerging directions in photon applications, including cutting-edge technologies in photon science. Attendees will also gain valuable research insights into the fundamental aspects of optical science, such as novel optical materials, which are vital for shaping future optical research.

ALPS 2025 will be held as part of the OPTICS & PHOTONICS International Congress (OPIC 2025), which comprises 15 optics-related scientific conferences. The 14th ALPS will feature over 200 outstanding presentations on the latest advancements in this field.

We look forward to your participation in the ALPS Conference and hope you have a rewarding experience.

The 11th Biomedical Imaging and Sensing Conference BISC 2025

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Izumi Nishidate
Tokyo University of Agriculture and Technology, Japan

On behalf of the Organizing and Program Committees, we are delighted that the 11th Biomedical Imaging and Sensing Conference will be held as part of the OPTICS & PHOTONICS International Congress (OPIC 2025).

In biomedical optics and photonics, optical tools are used to understand and treatment of disease, from the cellular level to clinical applications. At the cellular level, high-precision laser applications allow the manipulation, operation or stimulation of cells, even in living organisms or animals by using fluorescent protein and optogenetics. Optical microscopy has been revolutionized by the development of a wide variety of fluorescent dye probes and methods to control their excitation and fluorescence behavior. Various label-free imaging techniques, such as multiphoton microscopy, second- and third-harmonic generation methods, and Raman microscopy, are spreading into many biological and clinical applications. Optical coherence tomography continues to expand its clinical and preclinical applications with higher resolution, faster speed, further miniaturization, and the creation of novel approaches that enable imaging of functional information and tissue dynamics.

Biomedical imaging and sensing are the most rapidly advancing and expanding areas in optics and photonics. Techniques developed in these areas could bring us great advances in physical, engineering and biological knowledge as well as in optics and photonics technology. The aim of this conference is to cover several aspects, from the fundamental studies at the cellular level to the clinical applications of various optical technologies.

Finally, we hope that the 11th Biomedical Imaging and Sensing Conference will contribute to the progress in this field and wish you fruitful discussions.

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The Future of Agriculture and Advanced Photonics – The Fusion of Science and Technology for Sustainable Food Production FAAP 2025

Sponsored by
Executive Committee of "The Future of Agriculture and Advanced Photonics"

Conference Chair **Satoshi Wada**

RIKEN Center for Advanced Photonics, Photonics Control Technology Team, Team Director

The new conference "FAAP 2025 (Future of Agriculture and Advanced Photonics)" which aims at the fusion of science and technology for sustainable food production, will hold a joint session with LSSE 2025. FAAP 2025 conference aims to focus on advancements in optical technology in agriculture and its integration with other scientific and technological fields. It will provide a platform to discuss research and development while considering the environment and conditions surrounding agriculture. Additionally, the conference will promote international information exchange on the digitization and utilization of agriculture through optical technology and digital twin technology, with an emphasis on the digital transformation (DX) of agriculture.

We look forward to welcoming you to join us as we explore together the future of the Fusion of Science and Technology for Sustainable Food Production.

FAAP 2025 is collaborated with OPIC 2025 (Optics & Photonics international Congress 2025).

OPIC is the largest conference in OPTICS and PHOTONICS in Japan with more than 10 conferences in addition to FAAP.

FAAP 2025 will be held at Pacifico Yokohama Japan and on-line.

We are looking forward to seeing you all in Yokohama!

International Conference on High Energy Density Science 2025 HEDS 2025

Sponsored by
Institute of Laser Engineering, Osaka University

Conference Co-Chair
Ryosuke Kodama
Osaka University, Japan

Conference Co-Chair
Natsumi Iwata
Osaka University, Japan

We are delighted that you have joined the 13th International Conference on High Energy Density Science (HEDS) within the framework of OPTICS & PHOTONICS International Congress (OPIC).

HEDS covers the high energy density (HED) sciences with high power lasers and their applications. The primary topic of HEDS 2025 is "Fast Dynamics and Transport in High Energy Density States". High intensity lasers open access to fast dynamics in HED states, including phase transitions under high pressure, plasma and field structure formation, and energy transport in non-equilibrium conditions. Understanding these physics is essential for materials science, fusion energy science, astrophysics, and other applications. Novel diagnostics such as XFEL, and laser-driven particle and radiation sources are key to elucidating the physics.

HEDS 2025 invites scientists worldwide in the fields of "Fast Dynamics and Transport in High Energy Density States" including experimental and theoretical/numerical works. We want to promote discussions by sharing the latest results on various HED states to stimulate each other and foster friendships for future collaborations.

HEDS 2025 is co-sponsored by the Institute of Laser Engineering, Osaka University. We hope you enjoy the conference, which is held in person at Yokohama.

International Conference on Nano-photonics, Nano-optoelectronics and Quantum Technology 2025 ICNNQ 2025

Sponsored by
Institute for Nano Quantum Electronics, The University of Tokyo

Conference Co-Chair
Yasuhiko Arakawa
University of Tokyo

Conference Co-Chair
Jonathan J. Finley
Technical University of Munich

It is our distinct pleasure to extend a warm welcome to the International Conference on Nano-photonics, Nano-optoelectronics and Quantum-technology (ICNNQ 2025). Continuous advances in nanoscale devices and quantum technologies continue to redefine the landscape of scientific research and innovation in academia and industry, and ICNNQ 2025 will bring together leading researchers and experts in nano-photonics, nano-optoelectronics and quantum technologies to foster academic exchange, promote collaborative research and spark thought-provoking discussions.

Until last year, the conference was known as ICNNQ, and quantum photonics was already included in its thematic scope. However, in honor of the 10th edition of the conference and in recognition of the growing importance of quantum technologies, we have now officially incorporated quantum photonics into the conference title. This change underscores our commitment to highlighting the latest breakthroughs and addressing the pressing challenges of this rapidly evolving field. The two-and-a-half-day program will consist of oral and poster sessions, including three keynote lectures and ten invited talks. ICNNQ 2025 will also include a special session entitled "Advanced quantum light sources," which will feature four invited speakers who have made outstanding contributions to the field.

As ICNNQ 2025 General Chairs, we extend our heartfelt gratitude to all oral speakers and poster presenters for sharing their technical achievements. We also deeply appreciate the dedication of the conference committee members, particularly the program committee, for their invaluable contributions in reviewing submitted papers and ensuring the success of ICNNQ 2025.

We hope you find ICNNQ 2025 intellectually stimulating, engage in enriching discussions, and leave with fresh perspectives that inspire future innovations.

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Conference on Laser and Synchrotron Radiation Combination Experiment 2025 LSC 2025

Sponsored by
Institute of Laser Engineering, Osaka University

Conference Chair **Toshihiko Shimizu**

Institute of Laser Engineering, Osaka University

We are pleased to welcome you to the Conference on Laser and Synchrotron Radiation Combination Experiment (LSC) 2025.

As part of the OPTICS & PHOTONICS International Congress (OPIC), LSC aims to converge all scientists and engineers who are working on laser and synchrotron experiments all over the world.

The conference features invited talks and presentations on the recent developments, activities, and trends in lasers and synchrotron sources, instrumentation, experimental techniques, and applications. Especially we will focus on the rapid development of new experimental techniques such as ultrashort pulse lasers and X-ray free electron lasers, which made the study of sub-picosecond dynamics more accessible. A breakthrough, which has not been possible just by studying static properties of materials, is expected to occur by studying sub-picosecond dynamics. Given the current state of this research field, cooperation between laser and synchrotron is getting more and more important. In recent years, interdisciplinary research, in which lasers and synchrotron radiation are applied to fields with which they have had little involvement, has become possible, and we expect that more and more researchers will participate in this area in the future, expanding the community.

Today, interdisciplinary complex research is an important issue in the world. It is not limited to science-related disciplines, but extends from environment, energy, and resources to humanities-related disciplines. From this perspective, the collaboration between lasers and synchrotron radiation, which is the theme of this conference, still has potential for further development, and I hope that your advanced presentations will provide mutual stimulation.

We are very pleased that the conference has become a hybrid online event, attracting a larger and more diverse audience. We hope that you will find all the LSC and OPIC activities interesting, engaging, and beneficial. We are very grateful for your participation, and we hope you will have great time at the conference.

Laser Solutions for Space and the Earth 2025
LSSE 2025

Sponsored by
The executive committee of Laser Solution for Space and the Earth

Conference Chair **Satoshi Wada**

RIKEN Center for Advanced Photonics, Photonics Control Technology Team, Team Director

The aim of "Laser Solutions for Space and the Earth (LSSE)" is to discuss the application of emerging laser and optical technologies to solve various problems for sustainable developments of space and the earth.

The featured topics in LSSE 2025 are "Renewable Energy/Carbon Neutral", "Space Technology", "Remote Sensing/ LiDAR" and "Industrial Application" and "Agri-Photonics". "Agri-Photonics" are joint session with FAAP 2025 (the Future of Agriculture and Advanced Photonics) that is NEW Conference for the fusion of science and technology for sustainable food production. We have some keynote lectures and many invited talks.

LSSE 2025 will be held at Pacifico Yokohama Japan and on-line.

LSSE 2025 is collaborated with OPIC 2025 (Optics & Photonics international Congress 2025). OPIC is the largest conference in OPTICS and PHOTONICS in Japan with more than 10 conferences in addition to LSSE. You can also participate in OPIC 2025 by participating in LSSE 2025.

We are looking forward to seeing you all in Yokohama!

Meta Photonics: Design, Fabrication, Characterization, and Applications META 2025

Sponsored by
City University of Hong Kong
RIKEN Center for Advanced Photonics

Conference Co-Chair
Din Ping Tsai
City University of Hong Kong

Conference Co-Chair
Takuo Tanaka
RIKEN

Welcome to the international conference on Metaphotonics 2025 (META 2025), which will be held as part of Optics & Photonics International Congress in Yokohama, Japan.

Recent progress in advanced nanoscale fabrication and measurement technologies enables us to fully utilize unprecedented optical phenomena and functionalities arising from interactions between light and nanometer-scale structures. These developments are opening up new frontiers in optical and photonic science and technologies such as metamaterials, plasmonics, nanophotonics, and quantum optics/photonics. This conference will provide a great opportunity for researchers in these fields from around the world to share advancements, discoveries, and challenges, while engaging in valuable discussions.

As the chairs of META 2025, we would like to express our sincere gratitude to all speakers to discuss their technical achievements. Moreover, we thank all the conference committee members for their great contribution to the success of META 2025.

We wish that all the participants enjoy excellent presentations and discussion at META 2025.

The 12th Optical Manipulation and Structured Materials Conference OMC 2025

Sponsored by
SPIE.

Conference Co-Chair
Takashige Omatsu

Chiba University, Japan

Conference Co-Chair
Kishan Dholakia

The University of Adelaide, Australia; University of St. Andrews, UK

Conference Co-Chair
Sile Nic Chormaic

Okinawa Institute of Science and Technology Graduate University, Japan

Since the first demonstration of an optical tweezer based on optical radiation forces (scattering and gradient forces) created by a tightly focused laser beam, optical tweezers have been widely investigated in a variety of research fields, including biology, physics, and chemistry. In fact, Dr. A. Ashkin was awarded Nobel Prize in Physics, for contributing to a pioneering work of optical manipulation, 2018.

Conventional optical tweezers have been mostly adopted to dielectric particles with a dimension range from hundreds of nanometers to tens of micrometers. However, they do not always enable us to efficiently trap metallic particles.

In recent years, plasmonic tweezers based on enhanced radiation forces owing to surface plasmon polaritons in metallic nanostructures have been successfully demonstrated to efficiently trap and manipulate both nanoscale-sized dielectric and metallic particles.

Also, structured lights, such as higher order Laguerre-Gaussian and Bessel beams carry orbital angular momentum, and they provide unique tweezing abilities, for instance, for inducing an orbital motion of the trapped particles without employing mechanical systems. Further, beyond these conventional structured light, modern structured light encompasses a particle-like waveform with topological wavefront or polarization textures, called optical quasiparticles.

Since 2014, the OMC has successfully collected more than 80 participants from home and abroad. The OMC 2025 conference aims to present and discuss up-to-date scientific subjects, new technologies, and applications related to the fields of optical and plasmonic tweezers, the manipulation of nanostructures, structured optical fields and their satellite topics.

We hope that this conference will also facilitate scientific and professional networking as well as scientific inspiration through discussions.

Conference Co-Chairs

Takashige Omatsu *Chiba University, Japan*
Kishan Dholakia *The University of Adelaide, Australia; University of St. Andrews, UK*
Sile Nic Chormaic *Okinawa Institute of Science and Technology Graduate University, Japan*

Program Committee

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Satoshi Ashihara *The University of Tokyo*
Kyoko Kitamura *Tohoku University*
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Seigo Ohno *Tohoku University*
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Yuichi Kozawa *Tohoku University*
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Hiromi Okamoto *Institute for Molecular Science, Japan*
Yasuhiro Sugawara *Osaka University, Japan*
Xiaodi Tan *Fujian Normal University, China*
Yasuyuki Tsuboi *Osaka Metropolitan University, Japan*
Nirmal Viswanathan *University of Hyderabad, India*

Optical Technology and Measurement for Industrial Applications 2025 OPTM 2025

Co-Sponsored by
SPIE, Technical Committee for Mechano-Photonics, The Japan Society for Precision Engineering

Conference Co-Chair
Rainer Tutsch

Technische Universität Braunschweig

Conference Co-Chair
Toru Yoshizawa

Tokyo University of Agriculture and Technology, Prof. Emeritus
Non-Profit Organization: 3D Associates, Director

Conference Co-Chair
Yukitoshi Otani

Utsunomiya University

The aim of OPTM 2025 is to provide an international opportunity for introducing up-to-date technology in the field of optical measurement and its applications for industries. At the same time, providing a networking opportunity among young researchers and students is another important role of the conference. At the same venue, other optics-related exhibitions and conferences will also be held, providing a good chance to foster interest in different technical fields. We hope your visit to the port of Yokohama will be a nice experience in your technical and research career.

Conference Co-Chairs
Rainer Tutsch *TU Braunschweig, Germany*
Toru Yoshizawa *NPO 3D Associates, Japan*
Yukitoshi Otani *UtsunomiyaUniversity, Japan*

Organizing Committee Chair
Ryoichi Kuwano *Hiroshima Institute of Technology, Japan*

Program Committee Chair
Yasuhiro Mizutani *Osaka Univ., Japan*

Program Committee
Masato Aketagawa *Nagaoka Univ. of Technology, Japan*
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Ichiro Ishimaru *Kagawa Univ., Japan*
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Yusuke Kajihara *Institute of Industrial Science, The Univ. of Tokyo, Japan*
Qian Kemao *NTU, Singapore*
Daesuk Kim *Chonbuk National Univ., Korea*
Jonathan Kofman *Univ. of Waterloo, Canada*
Daisuke Kono *Kyoto Univ., Japan*
Ryoichi Kuwano *Hiroshima Institute of Technology, Japan*
Yu-Lung Lo *National Cheng Kung Univ., Taiwan*
Hiraku Matsukuma *Tohoku Univ., Japan*
Kimihisa Matsumoto *Toyama Prefectural Univ., Japan*
Masaki Michihata *The Univ. of Tokyo, Japan*
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Pavel Pavlicek *Institute of Physics of the Czech Academy of Science, Czech*
Takamasa Suzuki *Niigata Univ., Japan*
Satoru Takahashi *The Univ. of Tokyo, Japan*
Toshitaka Wakayama *Saitama Medical Univ., Japan*
Wei-Chung Wang *National Tsing Hua Univ., Taiwan*
Gao Wei *Tohoku Univ., Japan*
Jiangtao Xi *Univ. of Wollongong, Australia*
Hayato Yoshioka *Institute of Industrial Science, The Univ. of Tokyo, Japan*
Song Zhang *Purdue Univ., USA*

The 7th Optical Wireless and Fiber Power Transmission Conference OWPT 2025

Sponsored by
The Laser Society of Japan
In cooperation with
The Study Group of Optical Wireless Power Transmission

Conference Chair
Kayo Ogawa
Japan Women's Univ., Japan

Conference Chair
Tomoyuki Miyamoto
Institute of Science Tokyo, Japan

It is our great honor to welcome you to the 7th Optical Wireless and Fiber Power Transmission Conference (OWPT 2025). OWPT 2025 will be held as a hybrid online/onsite conference. The venue will be in Yokohama, Japan.

OWPT 2025 is an international conference intended to provide a central forum for updating and reviewing scientific and technical information on optical wireless power transmission and optical fiber power transmission, covering a wide range of areas from fundamental research to systems and applications. OWPT 2025 is organized as part of the OPTICS & PHOTONICS International Congress (OPIC 2025), which consists of 14 optics and photonics related scientific conferences. OWPT 2025 is sponsored by the Laser Society of Japan, and in cooperation with the Study Group of Optical Wireless Power Transmission in Japan. OWPT 2025 will consist of 2 plenary talks, 1 special talk, 8 invited talks, and 23 contributed papers aiming at important developments in the field covering novel materials/devices and components, systems and subsystems, applications, and related topics.

Please join the community and learn more about the latest activities and achievements of OWPT 2025.

Sensing and Imaging through Scattering and Fluctuating Field in Biology, Telecommunication, and Astronomy SI-Thru 2025

Conference Co-Chair
Osamu Matoba
Kobe University, Japan

Conference Co-Chair
Sylvain Gigan
Sorbonne Université, France

Optics and related imaging technologies have played an indispensable role in the development of natural science. However, one of the fundamental problems that cannot be overcome even with the most advanced optical technology is scattering and fluctuations that disturb the straightness of propagating light. Statistical scattering theories determined by wavelength and particle size have already been established. Adaptive optics is also established to compensate the light distortion in astronomy. However, no comprehensive theory has been established to deal with scattering and fluctuations in multi-scale, four dimensions (three-dimensional space and time), which are ubiquitous in the real world in air, water, and living organisms.

The purpose of this conference is to present and discuss the latest techniques, theories, and results for comprehensively understanding and overcoming scattering and fluctuation phenomena that are ubiquitous in multi-scale three-dimensional space, ranging from submicrometer to kilometer size. Applications include bioimaging, spatial information communication, astronomy, and other areas related to scattering and fluctuations. It features a new approach based on digital twin, which integrates physical and virtual worlds, including measurement techniques of scattering and fluctuation fields, active corrections of distorted light, and modeling of scattering and fluctuation fields. This is the second time conference since 2022. We are very welcome to join this conference for presentations and exchange of ideas.

Topics

- Imaging through scattering media
- Imaging through fluctuating media
- Wavefront sensing
- Wavefront shaping
- Digital phase conjugation
- Transmission/reflection matrix approaches
- Scattering and fluctuation theory
- Scattering and fluctuation modeling
- Diffuse optical imaging
- Computational imaging
- Single-pixel imaging
- Ghost imaging
- Deep learning and machine learning
- Non-line-of-sight imaging
- Deep live-cell imaging
- Deep optical cell manipulation
- Live brain imaging
- Ultrasound imaging
- Photoacoustic imaging
- Nondestructive testing
- Adaptive optics
- Observational astronomy
- High-contrast imaging of exoplanet
- Spatial light modulation and deep biometry
- Next-generation communications
- Telecommunication
- Spatial information communication
- Modulation and coding
- Pointing, acquisition, and tracking
- Atmospheric propagation
- Transmitters and receivers for communication
- Terrestrial networks
- Quantum communication
- Other related areas

The 11th Tiny Integrated Laser and Laser Ignition Conference 2025 (TILA-LIC 2025)

Organized by
Micro Solid-State Photonics Association
Co-organized by
Laser-Driven Electron-Acceleration Technology Group (RSC)
Division of Research Innovation and Collaboration (IMS)

Conference Chair **Takunori Taira**

RIKEN SPring-8 Center (RSC) / Institute for Molecular Science (IMS)

Welcome to the 11th Tiny Integrated Laser and Laser Ignition Conference 2025 (TILA-LIC 2025), which is the international forum for discussions on various aspects of the ubiquitous sources and phenomena associated with highly intense laser pulses. TILA-LIC offers to share information on sciences and technologies related to Giant Micro-photonics. "Tiny Integrated Laser (TILA)" means the compact integration of highly intense laser devices and peripheral systems that enables ubiquitous operation of extraordinarily accurate measurements and control of extreme material phases. Here, the word "laser ignition (LI)" originally means the laser induced breakdown ignition, and it also implies the induction of phenomena caused by the irradiation of high-brightness laser pulses until the TILA based material processing, laser driven particle acceleration and the other intense laser applications. Based on the recent photonic innovation called by Giant Micro-photonics, ubiquitous lasers symbolized by TILA that can be operated at everywhere and anytime by everybody can become the door to promote the world to a new generation. The conference will be held at Pacifico Yokohama, Yokohama, Japan, on April 23-25, 2025 with the sponsorship from Laser-Driven Electron-Acceleration Technology Group, RIKEN SPring-8 Center, and Division of Research Innovation and Collaboration, Institute for Molecular Science in cooperation with several academic societies and associations.

After TILA-LIC opening talks, a total of 44 papers will be presented, consisting of three Keynote, 11 Invited papers, and 26 Contributed papers. In addition, we organize introduction talks with regarding the TILA related company activity. At the closing remarks, award ceremony will be held at which several papers will be commended for their outstanding achievement. We would like to extend our thanks to all the presenters and participants of TILA-LIC 2025 for their contribution to the success of the conference. We also express our thanks to the endorsement and sponsor groups.

International Conference on X-ray Optics and Applications 2025 XOPT 2025

Co-Sponsored by
RIKEN SPring-8 Center
Osaka University-RIKEN Center for Science and Technology
Technical Committee for Ultraprecision Machining of JSPE

Conference Co-Chair
Tetsuya Ishikawa
RIKEN, Japan

Conference Co-Chair
Kazuto Yamauchi
Osaka University, Japan

We are pleased to host the 10th International Conference on X-ray Optics and Applications (XOPT 2025) as part of the Optics and Photonics International Congress 2025 (OPIC 2025).

X-rays have played a vital role in many breakthrough scientific discoveries in recent years. Continuous innovations in X-ray optics, methodologies, and beamline instruments have laid the foundation for these achievements. For this conference, we are inviting leading experts in these fields worldwide to share the latest status of X-ray technology and developments and discuss their plans for the future.

The three-day XOPT 2025 program will feature oral sessions that include contributed and invited talks, and a poster session. These sessions will cover a wide range of topics, including advancements in state-of-the-art X-ray sources such as 4th generation synchrotron radiation (SR) sources, advanced XFELs (X-ray Free-Electron Laser), novel X-ray optics and beamline instruments, and cutting-edge X-ray imaging techniques driven by AI and innovative algorithms. For details, please visit the XOPT website (https://xopt.opicon.jp/).

We hope that XOPT 2025 will provide a platform for meaningful discussions for all participants and contribute to further advancements in this field.

Conference Co-Chairs
Tetsuya Ishikawa *RIKEN, Japan*
Kazuto Yamauchi *Osaka University, Japan*

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Takato Inoue *Nagoya University, Japan*
Wataru Yashiro *Tohoku University, Japan*
Yuya Kubota *RIKEN, Japan*

OPIC 2025 Conferences Program

Oral Sessions

Oral, Monday, 21 April AM

ALPS <Room 303>

[ALPS-OP] 10:30-10:45
Opening Remarks
Chair: Hitoki Yoneda
Institute for Laser Science, University of Electro-Communications

[ALPS-C1] 10:45-12:00
High peak power lasers, high pulse energy lasers and applications (1)
Chair: Jumpei Ogino
Osaka University

ALPS-C1-01 10:45 ***Invited***

High Energy, High Repetition Rate Laser Development at Advanced Photon Technologies, LLNL
Saumyabrata Banerjee, Anthony Vella, František Batysta, Thomas Galvin, Issa Tamar, Zbynek Hubka, Andrew Yandow, Leily Sehaar Kiani, Justin Galbraith, Emily Sistrunk, Brendan A. Reagan, Thomas Spinka, James McCarrick
Lawrence Livermore National Laboratory
High energy coupled with high repetition rates introduce detrimental effects like thermal stress-induced depolarization losses. We present an innovative design for a two-head, gas-cooled multi-slab neodymium-doped glass amplifier aimed at mitigating depolarization for wide spectrum bandwidth.

ALPS-C1-02 11:15

High brightness laser diode bar stack for pumping applications
Nobuto Kageyama[1], Tomoya Kitajima[1], Masashi Kamei[2], Satoru Okawara[3], Kousuke Torii[3], Takehito Nagakura[3], Takashi Sekine[1], Toshiyuki Kawashima[1]
[1]Central Research Laboratory, Hamamatsu Photonics K.K., [2]Laser Division, Hamamatsu Photonics K.K., [3]Solid State Division, Hamamatsu Photonics K.K.
We report on the characteristics of a 940 nm laser diode bar stack with a high brightness of 22 kW/cm2 and a high peak output power of 33 kW at a repetition rate of 10 Hz.

ALPS <Room 511+512>

[ALPS-A1] 11:15-12:15
Laser Materials
Chair: Masaki Yumoto
AIST

ALPS-A1-01 11:15 ***Invited***

Growth, spectroscopy and anisotropic properties of Yb^{3+}- and Tm^{3+}-doped $MgWO_4$ crystals
Xavier Mateos[1], Ghassen Zing Elabedine[1], Rosa Maria Solé[1], Sami Slimi[1], Magdalena Aguiló[1], Francesc Díaz[1], Weidong Chen[3], Valentin Petrov[2]
[1]University Rovira i Virgili, [2]Max Born Institute for Nonlinear Optics and Ultrafast Spectroscopy, [3]Fujian Institute of Research on the Structure of Matter, Chinese Academy of Sciences
We review a new growth methodology, optical and spectroscopic (including absorption, emission, gain and Raman) properties of undoped, and Yb and Tm-doped monoclinic $MgWO_4$ with emphasis on anisotropy and polarization dependence.

ICNNQ <Room 414+415>

[ICNNQ-OP] 9:50-10:00
Opening remarks
Chair: Shinji Matsuo
NTT

[ICNNQ1] 10:00-11:45
Keynote
Chair: Shinji Matsuo
NTT

ICNNQ1-01 10:00 ***Keynote***

Telecom Wavelength Quantum Dot Single-Photon Sources for Quantum Technologies
A. Pfenning, T. Huber-Loyola, Sven Höfling
Julius-Maximilians-Universität Würzburg
Semiconductor quantum dots integrated in resonators are a promising candidate as resources in photonic quantum technologies. Here, we present an overview of recent developments in our group on the engineering of single-photon sources for quantum photonic applications made from III-V semiconductor quantum dots grown by molecular beam epitaxy.

ICNNQ1-02 10:35 ***Keynote***

2D materials for quantum photonics and simulation
Jonathan J. Finley
Technical University of Munich
TBD

ICNNQ1-03 11:10 ***Keynote***

Heterogeneous Integration of Silicon Photonics for Artificial Intelligence
Mitsuru Takenaka
The University of Tokyo
This keynote explores how integrating III-V semiconductors, phase change, and ferroelectric materials on Si photonics platform enables efficient optical phase shifters, power monitors, and optoelectronic converters, advancing photonic AI accelerators through heterogeneous material integration.

Oral, Monday, 21 April AM

ALPS <Room 303>	ALPS <Room 511+512>	ICNNQ <Room 414+415>	
ALPS-C1-03 11:30 **Isolator gas optics for high energy lasers** Yurina Michine, Hitoki Yoneda *University of Electro-Communications* To be used as an optical isolator with gas optics in high-energy lasers, the temperature distribution in a gas is controlled by the irradiation of several ultraviolet laser pulses.			
ALPS-C1-04 11:45 **An approach for quantifying beam distortion caused by pump light-induced thermal convection in liquid SBS-PCMs** Bowen Tan[1,2], Yifu Chen[2], Zhenxu Bai[2], Kun Wang[1] [1]*School of Energy and Environmental Engineering, Hebei University of Technology,* [2]*Center for Advanced Laser Technology, Hebei University of Technology* By introducing photothermal parameters that integrate pump light and heat source effects, this study quantifies, for the first time, the process of beam distortion induced by pump light-driven thermal convection.	**ALPS-A1-02 11:45** *Invited* **Progress of few-cycle Kerr-lens mode-locked ytterbium lasers** Weidong Chen *Fujian Institute of Research on the Structure of Matter, Chinese Academy of Sciences, China* We report recent advancements in few-optical-cycle Kerr-lens mode-locked solid-state ytterbium laser via soft-aperture Kerr-lens mode-locking using an ytterbium-doped disordered calcium rare-earth oxoborate crystal as the gain medium.	----- Lunch 11:45-13:30 -----	
----- Lunch 12:00-13:15 -----	----- Lunch 12:15-13:30 -----		

Oral, Monday, 21 April PM

ALPS <Room 303>

[ALPS-C2] 13:15-14:45
High peak power lasers, high pulse energy lasers and applications (2)
Chair: Takaaki Morita
Hamamatsu Photonics K.K.

ALPS-C2-01 13:15 *Invited*

Intense Mid-Infrared Lasers for Attosecond X-ray Sources and Strong Field Physics
Zenghu Chang
University of Ottawa
Few-cycle chirped pulse amplifiers centered at 4.1 micron based on Fe:ZnSe and chirped pulse optical parametric amplifiers at 3 to 5-micron pumped with 2-micron lasers with high conversion efficiency has been demonstrated.

ALPS-C2-02 13:45

Theoretical Analysis of an Isolated Attosecond Pulse Generation Using Sub-Cycle Driving Fields
Rambabu Rajpoot, Eiji J. Takahashi
RIKEN Center for Advanced Photonics, RIKEN
We analyzed the impact of sub-cycle driving fields on high-order harmonic generation, focusing on intrinsic-chirp, CEP, and pulse duration. Despite higher attochirp and reduced cutoffs, sub-cycle driving field enables efficient isolated attosecond pulse generation.

ALPS-C2-03 14:00

Experimental observation of evanescent field induced harmonic generation in pre-ionized liquid water
Tomoya Mizuno, Tianqi Yang, Takayuki Kurihara, Teruto Kanai, Jiro Itatani
ISSP, Univ. of Tokyo
High harmonics are generated in pre-ionized water above the critical plasma density. Observed narrow spectral width suggests that the high harmonics are generated by the penetrating evanescent field.

ALPS-C2-04 14:15

Development of TW-class CEP-stabilized MIR sub-cycle laser
Kaito Nishimiya, Eiji Takahashi
RIKEN
We developed a TW-class sub-cycle laser (6.88 fs, 0.88 cycles, 0.37 TW) using advanced DC-OPA for broadband HHG. This system will be upgraded to 100 mJ-class and >70% continuous HHG spectrum.

ALPS <Room 511+512>

[ALPS-A2] 13:30-14:45
Nonlinear Optical Materials
Chair: Kentaro Miyata
RIKEN

ALPS-A2-01 13:30 *Invited*

Advances in backward-wave nonlinear optical devices
Valdas Pasiskevicius, Patrick Mutter, Andrius Zukauskas
Royal Institute of Technology KTH, Sweden
The current status of the experimental work on counter-propagating three-wave mixing, their applications, and future directions will be overviewed in this presentation.

ALPS-A2-02 14:00

Numerical modeling of non-resonant optical parametric oscillators
Gerhard Spindler[1], Marcin Piotrowski[1], Valentin Petrov[2]
[1]French-German Research Institute, [2]Max Born Institute for Nonlinear Optics and Ultrafast Spectroscopy
We present numerical simulation results on broadband and narrowband (using a Volume Bragg Grating as a signal mirror) operation of a 1-μm pumped non-resonant PPLN optical parametric oscillator in close agreement with the experiment.

ALPS-A2-03 14:15

Surface damage studies of CdSe nonlinear crystals
Amelia Carpenter[1], Kevin Cissner[1], Shekhar Guha[1], Valentin Petrov[2]
[1]Air Force Research Laboratory, [2]Max Born Institute for Nonlinear Optics and Ultrafast Spectroscopy
We report surface damage tests at 1550 and 9569 nm of randomly oriented CdSe using different pulse durations, repetition rates and focusing conditions.

ALPS <Room 413>

[ALPS-J1] 13:30-14:45
Quantum information
Chair: Yoshiaki Tsujimoto
NICT

ALPS-J1-01 13:30 *Invited*

Applications of Silicon Photonics to Quantum Circuits and Their Integration with Machine Learning
Takafumi Ono
Kagawa University
Silicon photonic integrated circuits have attracted significant attention in the field of quantum information science. In this presentation, I will present our latest results on quantum machine learning using silicon photonic integrated circuits.

ALPS-J1-02 14:00

Study on entanglement generation between frequency-multiplexed quantum memories using two-photon sources
Hiroki Tateishi[1], Tomoki Tsuno[1,3], Takuto Nihashi[1], Daisuke Yoshida[1,3], Koji Nagano[2,3], Daisuke Akamatsu[1], Feng-Lei Hong[1,2], Tomoyuki Horikiri[1,2,3]
[1]Yokohama National University, [2]IMS, Yokohama National University, [3]LQUOM, Inc
We are developing quantum repeaters essential for the implementation of the quantum internet. We report the latest progress toward entanglement generation between quantum memories using cavity-enhanced two-photon sources.

ALPS-J1-03 14:15

Evaluation of Rate Improvement by Frequency Multiplexing in Quantum Repeater with Cavity-Enhanced SPDC as Two-Photon Source
Ryoma Komatsudaira, Tomoyuki Horikiri
Yokohama National University
In quantum repeater with single-photon interference scheme using cavity-enhanced SPDC as two-photon source, the rate improvement of entanglement generation by frequency multiplexing is discussed.

FAAP <Room 412>

[FAAP1] 13:00-15:05
Keynote 1
Chair: Satoshi Wada
RIKEN

FAAP-OP 13:00

Opening Remarks
Satoshi Wada
RIKEN

FAAP1-01 13:05 *Invited*

Prospects of Data-driven Agrifood Systems Upcoming
Sakae Shibusawa
Tokyo University of Agriculture and Technology
The term “data-driven agrifood systems” is standardized and become a core of future agriculture bonding many different events. Heliostat-combined wooden greenhouse, water saving system for farming and interoperable food chain system will be discussed.

FAAP1-02 14:05 *Invited*

Agri Open Innovation: Shizuoka Prefecture’s Efforts to Promote Agriculture
Kosuke Chris Yamada
Tokai University
The Agri Open Innovation (AOI) Institute, a foundation fully funded by Shizuoka Prefecture Government, provides various support activities to stakeholders in agriculture. The AOI Institute manages a members-only forum that has a membership of over 300. This presentation will mainly introduce our support activities for research and development for members.

Oral, Monday, 21 April PM

ICNNQ <Room 414+415>

[ICNNQ2] 13:30-15:00
Special Session: Advanced quantum light sources
Chair: Yasutomo Ota
Keio University

ICNNQ2-01 13:30 ***Invited***

Dynamics of Non-Classical Light Generation from Quantum Dots
Friedrich Sbresny, Katarina Boos, Sang Kyu Kim, Eduardo Zubizarreta, Carolin Calcagno, Jonathan J Finley, Lukas Hanschke, Kai Mueller
Technical University of Munich
We review excitation schemes for the generation of non-classical light from few-level quantum systems and benchmark their performance.

ICNNQ2-02 14:00 ***Invited***

A Quantum Dot in an Open Microcavity for Quantum Photonics
Malwina Marczak[1], Mark R. Hogg[1], Timon L. Baltisberger[1], Nadia O. Antoniadis[1], Giang N. Nguyen[1], Alisa Javadi[1], Rüdiger Schott[2], Sascha R. Valentin[2], Andreas D. Wieck[2], Arne Ludwig[2], Richard J. Warburton[1]
[1]University of Basel, [2]Ruhr-Universität Bochum
Quantum technologies are revolutionizing how we process and transmit information, with applications ranging from large-scale secure communication networks to quantum-enhanced sensing and computation. Single photons with their low-noise properties and the ability to transmit quantum information at the speed of light are set to play a central role in the field. An important aspect is the development of efficient, on-demand single-photon sources.

OPTM <Room 213>

[OPTM-OP] 13:45-14:00
Opening Remarks
Chairs: Toru Yoshizawa
NPO 3D Associates
Rainer Tutsch
TU Braunschweig
Yukitoshi Otani
Utsunomiya University

[OPTM1] 14:00-15:30
Interferometry
Chairs: Yukitoshi Otani
Utsunomiya University
Rainer Tutsch
TU Braunschweig

OPTM1-01 14:00 ***Invited***

An insight into signal processing method for dual-detection confocal probes
Ryo Sato, Hiraku Matsukuma, Wei Gao
Tohoku University
An insight into signal processing methods for dual-detection confocal probes, which are widely utilized for surface profile measurement and displace measurements, are described and categorized in this paper.

SI-Thru <Room 419>

[SI-Thru1] 13:20-15:00
Free-Space Optical Communications
Chair: Osamu Matoba
Kobe University

SI-Thru1-OP 13:20

Opening Remarks
Osamu Matoba
Kobe University

SI-Thru1-01 13:30

Measurements, Prediction and Mitigation of the Effects of Atmospheric Fluctuations in Free-Space Optical Communications
Yoshihisa Takayama[1], Ichiro Tamagawa[2], Tomonao Kobayashi[2], Hiroki Yoshida[2], Hideki Takenaka[3], Hiroki Yamashita[4]
[1]Tokai University, [2]Gifu University, [3]Tokyo Metropolitan University, [4]National Institute of Information and Communications Technology
Our research activities aiming to achieve measures for atmospheric fluctuations for stable free-space optical communications are introduced. The method for suppressing the atmospheric effects on transmitted light is explained.

SI-Thru1-02 14:00

Short-Term Prediction of Signal Intensity Fluctuations in Free-Space Optical Communications Using GRU-Based RNNs
Hideki Takenaka[1], Yoshihisa Takayama[2]
[1]Tokyo Metropolitan University, [2]Tokai University
This study explores the potential of machine learning to predict signal intensity fluctuations in free-space optical communications impacted by atmospheric turbulence.

SI-Thru1-03 14:15

Measurement of C_n2 Distribution by Differential Image Scheimpflug-LIDAR
Kaito Shinmura[1], Hiroki Yoshida[1], Ichiro Tamagawa[1], Tomonao Kobayashi[1], Reina Iwata[1], Taiga Nagase[1], Yoshihisa Takayama[2]
[1]Gifu University, [2]Tokai University
Laser transmission is a promising method for high-speed information and energy transfer between the Earth and space. However, atmospheric turbulence significantly affects efficiency. We developed a Differential Image Scheimpflug-LIDAR (DIS-LIDAR) to measure the refractive-index structure characteristic C_n2. Experimental results confirmed a height-dependent reduction in C_n2.

Oral, Monday, 21 April PM

ALPS <Room 303>

ALPS-C2-05 14:30

Sub-micrometer focusing of attosecond pulses for generating 10^{15} W/cm^2 soft X-ray field

Kotaro Imasaka[1], Natsuki Kanda[1], Dianhong Dong[1], Bing Xue[1], Satoru Egawa[2,3], Takuya Hosobata[2], Masahiro Takeda[2], Yutaka Yamagata[2], Eiji J. Takahashi[1]
[1]Ultrafast Coherent Soft X-ray Photonics Research Team, RAP, RIKEN, [2]Ultrahigh Precision Optics Technology Team, RAP, RIKEN, [3]Research Center for Advanced Science and Technology, The University of Tokyo

We have developed a high-precision focusing system for attosecond pulses realizing a sub-micrometer (0.69 μm) spot size in tangential plane, which has the potential to generate 10^{15} W/cm2 soft x-ray field.

----- Coffee Break 14:45-15:00 -----

[ALPS-C3] 15:00-16:30
High peak power lasers, high pulse energy lasers and applications (3)
Chair: Eiji Takahashi
RIKEN

ALPS-C3-01 15:00 ***Invited***

Strong-field QED research with multi-PW lasers

Mohammad Mirzaie[1,2], Calin Ioan Hojbota[1], Do Yeon Kim[1], Vishwa Bandhu Pathak[1], Chul Min Kim[1,2], Jae Hee Sung[1,2], Jin Woo Yoon[1,2], Seong Ku Lee[1,2], Marija Vranic[3], Oscar Amaro[3], Ki Yong Kim[1,4], Chang Hee Nam[1,4]
[1]Center for Relativistic Laser Science, Institute for Basic Science, Gwangju, Korea, [2]Advanced Photonics Research Institute, GIST, Gwangju, Korea, [3]GoLP/Instituto Superior Tecnico Unversidade de Lisboa, Lisbon, Portugal, [4]Department of Physics and Photon Science, GIST, Gwangju, Korea

We have performed experiments for nonlinear Compton scattering in a strong laser field, in which a single, multi-GeV electron scatters off hundreds of laser photons simultaneously producing gamma rays on the GeV scale far exceeded the linear Compton scattering cutoff.

ALPS <Room 511+512>

ALPS-A2-04 14:30

Vacuum ultraviolet generation below 185 nm in $CsLiB_6O_{10}$

Nobuhiro Umemura[1], Ryota Murai[2,3], Masashi Yoshimura[2,4], Tomosumi Kamimura[4,5], Taichi Morikawa[1], Yusuke Mori[2,3]
[1]Chitose Institute of science and Technology, [2]SOSHO CHOKO, Inc., [3]Graduate School of Engineering, Osaka University, [4]Institute of Laser Engineering, Osaka University, [5]Osaka Institute of Technology

Type-1 90° phase-matched sum-frequency generation at 182.8 nm was performed by mixing the fifth harmonic of a Nd:YAG laser at 1064.2 nm and the idler output of the $KTiOPO_4$ optical parametric oscillator pumped at 532.1 nm in $CsLiB_6O_{10}$.

----- Coffee Break 14:45-15:00 -----

[ALPS-A3] 15:00-16:15
Scintillators and Perovskite Materials
Chair: Shohei Kodama
Saitama Univ.

ALPS-A3-01 15:00 ***Invited***

Synthesis, optical properties and application potential of powdered, micrometric and fully inorganic halide perovskites doped with Yb^{3+} ions

Mariusz Stefański[1], Bartosz Bondzior[1], Maciej Ptak[1], Adam Sieradzki[2], Eunika Zielony[2], Wieslaw Strek[1]
[1]Institute of Low Temperature and Structure Research, Polish Academy of Sciences, Wrocław, Poland, [2]Faculty of Fundamental Problems of Technology, Wrocław University of Technology

This research reports results on the structural and spectroscopic properties of inorganic halide perovskites of micrometer size obtained in powder form. Potential applications of the obtained materials will also be presented.

ALPS <Room 413>

ALPS-J1-04 14:30

Heralded distribution of polarization entanglement using photon number basis Bell-state measurement

Hikaru Shimizu[1], Joe Yoshimoto[1], Junko Ishi Hayase[1], Rikizo Ikuta[2], Masahiro Takeoka[1,3]
[1]Keio University, [2]Osaka University, [3]National Institute of Information and Communications Technology

We generated two polarization-photon number hybrid entanglements and performed entanglement swapping by measuring photon number basis qubits. With this method, we successfully distributed polarization entanglement whose fidelity was 0.64.

----- Coffee Break 14:45-15:00 -----

[ALPS-J2] 15:00-16:15
Quantum foundation
Chair: Rikizo Ikuta
Osaka University

ALPS-J2-01 15:00 ***Invited***

Isolating Bosonic, Fermionic and Vacuum Dynamics of Plasmonic Waves

Omar S. Magaña-Loaiza
Louisiana State University

We investigate the quantum multiparticle dynamics of surface plasmons. Our experiments extract both bosonic and fermionic dynamics, enabling direct observation of plasmonic fields excited by the vacuum fluctuations of the electromagnetic field.

FAAP <Room 412>

FAAP1-03 14:35 ***Invited***

Sustainable Agriculture through Possible Utilization of Unused Resources

Shigeharu Moriya, Satoshi Wada
RIKEN

Currently, agricultural resources are supplied by chemical industry, but a significant portion could potentially be replaced by ecological resources. This presentation discusses these possibilities based on initiatives in Shizuoka Prefecture.

Oral, Monday, 21 April PM

ICNNQ <Room 414+415>

ICNNQ2-03 14:30

Unlocking multiphoton emission from a single-photon source through mean-field engineering

Sang Kyu Kim[1,2], Eduardo Zubizarreta Casalengua[1], Katarina Boos[1], Friedrich Sbresny[1], Carolin Calcagno[1], Hubert Riedl[3], Jonathan J. Finley[3], Carlos Antón-Solanas[4], Fabrice P. Laussy[5], Kai Müller[1], Lukas Hanschke[1], Elena del Valle[6,2]
[1]Walter Schottky Institut, TUM School of CIT, and MCQST, Technische Universität München, 85748 Garching, Germany, [2]Institute for Advanced Study, Technische Universität München, 85748 Garching, Germany, [3]Walter Schottky Institut, TUM School of Natural Sciences, and MCQST, Technische Universität München, 85748 Garching, Germany, [4]Departamento de Física de Materiales, Instituto Nicolás Cabrera, and IFIMAC, Universidad Autónoma de Madrid, 28049 Madrid, Spain, [5]Instituto de Ciencia de Materiales de Madrid ICMM-CSIC, 28049 Madrid, Spain, [6]Departamento de Física Teórica de la Materia Condensada, and IFIMAC, Universidad Autónoma de Madrid, 28049 Madrid, Spain

We demonstrate multiphoton emission and the individual suppression of photon numbers within single-photon emission, specifically in the resonance fluorescence of a two-level system under weak resonant excitation, achieved through homodyne mean-field engineering.

ICNNQ2-04 14:45

Influence of localized phonons on the performance of single photon emitters based on SiC color centers interacting with nanocavities

Makoto Yamaguchi[1], Takashi Asano[2], Heungjoon Kim[2], Bong-Shik Song[3], Susumu Noda[2]
[1]Tokai University, [2]Kyoto University, [3]Sungkyunkwan University

We developed a cavity quantum electrodynamics theory by assuming a V2 center in SiC, based on the quantum master equation under the polaron frame. Our numerical results suggest that simultaneous near-unity efficiency and indistinguishability (>~99%) can be achieved by a SiC V2 center interacting with a nanocavity under practical conditions.

----- Coffee Break 15:00-15:30 -----

OPTM <Room 213>

OPTM1-02 14:30

Comparative spectral analysis of tapered optical fiber Mach–Zehnder interferometer as chloride ion concentration sensor

Jian-Neng Wang, Pei-Hsuan Wu, Yu-Xuan Zhuang
National Yunlin University of Science and Technology

This paper presents the comparative spectral analysis of a tapered optical fiber Mach–Zehnder interferometer (MZI) as a chloride ion concentration sensor by analyzing five parameters. The MZI sensor exhibited a linear increase in the transmission loss or average interference fringe spacing when concentration increased; however, there is a linear decrease in the wavelength shift, average amplitude, or three integral areas when concentration increased.

OPTM1-03 14:45

Development of a Cyclic Interferometer for Displacement Measurement

Sheng-Wei Wang, Hung-Lin Hsieh, Tsung-Hua Tsai, Xiao-Ming Tao
National Taiwan University of Science and Technology

A novel cyclic grating interferometer achieves high-precision displacement measurement with enhanced sensitivity, reduced noise, and excellent stability, showing 18 nm drift over 30 minutes and strong consistency with a capacitive sensor.

OPTM1-04 15:00

Grating Interferometry for Alignment Key Period Detection

Chen-Ming Tsai[1], Chih-Hsiang Chang[1], Po-Han Chen[1], Cheng Chih Hsu[1], Chyan-Chyi Wu[2], Ching-Liang Dai[3]
[1]National United University, [2]Tamkang University, [3]National Chung Hsing University

This paper proposes a method for measuring grating periods of alignment key using heterodyne grating interferometry. Experiment results verified the method's accuracy, achieving a difference of less than 1% compared to the manufacturer's specifications and a precision of better than 1 nm.

OPTM1-05 15:15

Increasing the Slope Measuring Range of Collimated Phase Measuring Deflectometry

Lei Huang, Corey Austin, Tianyi Wang, Mourad Idir
Brookhaven National Laboratory

CPMD is a measurement technique with a range of potential applications developed at Brookhaven National Laboratory to measure both highly-curved and freeform x-ray reflective optics. In this work, we describe changes to the optical layout of the system that increase the slope measuring range and share the results of measurements made on various freeform surfaces.

SI-Thru <Room 419>

SI-Thru1-04 14:30

Measurement of C_n2 from Atmospherically Disturbed Images

Hiroki Yoshida[1], Kaito Shinmura[1], Ichirou Tamagawa[1], Tomonao Kobayashi[1], Reina Iwata[1], Taiga Nagase[1], Yoshihisa Takayama[2]
[1]Gifu University, [2]Tokai University

Atmospheric turbulence might cause communication errors in optical communication. Refractiveindex structure constant C_n2 is known as a countermeasure of atmospheric turbulence strength. Numerous attempts havebeen made to measure C_n2, but no method was reported for high-resolution spatial distribution. To realize it, we have been developing a Differential Image Scheimpflug-LIDAR and other optical devices to evaluate their consistency.

SI-Thru1-05 14:45

Evaluation of Cn2 with high resolution by applying weather model and turblence model

Tomonao Kobayashi[1], Ichiro Tamagawa[1], Yoshihisa Takayama[2], Hiroki Yoshida[1]
[1]Gifu University, [2]Tokai University

The optical fluctuation of the atmosphere, which is effect to quality of optical communication, is evaluated with the weather forecasting model and the turbulence model with high resolution.

----- Coffee Break 15:00-15:30 -----

Oral, Monday, 21 April PM

ALPS <Room 303>

ALPS-C3-02 15:30 *Invited*

Ultra-Intense and Ultra-Short Laser and its Applications

Yuxin Leng
SIOM, Chinese Academy of Sciences

A series of ultra-intense and ultra-fast lasers (0.2PW, 1PW and 10PW lasers) have been developed which have been in opening operation for international end users. The applications based on the lasers will be presented briefly.

ALPS-C3-03 16:00

20-dimension Bayesian Optimization of maximum proton energy in the TNSA regime using dynamic wavefront shaping

Elias Catrix, Sylvain Fourmaux, Simon Vallières, Patrizio Antici
Institut national de la recherche scientifique

We have demonstrated the use of Bayesian optimization combined with dynamic wavefront shaping by utilizing 20 actuators of a deformable mirror to maximize the cut-off energy of laser-driven protons in the TNSA regime.

ALPS-C3-04 16:15

Adaptive Plasma Targets for Laser Particle Acceleration and Generation of Secondary Radiation

Vidmantas Tomkus[1], Mehdi Abedi-Varaki[1], Valdas Girdauskas[1,2], Tariq Saqlain Sahi[1], Migle Mackeviciute[1], Valdemar Stankevic[1], Paulius Gecys[1], Gediminas Raciukaitis[1]
[1]Center for Physical Sciences and Technology FTMC, [2]Vytautas Magnus University

In this study, we report about the simulation, design and manufacturing of adaptive plasma targets based on supersonic nozzles optimized for Laser Acceleration of electrons, protons, and generation of secondary X-ray radiation.

ALPS <Room 511+512>

ALPS-A3-02 15:30

A Novel Porous PbI_2 Thin Film was used to Improve the Two-step Solution Spin Coating Technique and Application on Perovskite Solar Cells

Chia-Ching Wu, Lee Yi-Lun, Xu Chia Ching Yan-Jing, Huang Si-Yu, Liu Bo-Hong, Yen Zi-Chi
Department of Applied Science, National Taitung University

The high power conversion efficiency of the ITO glass/SnO_2/$MAPbI_3$ -Mxene/Spiro-OMTAD/Ag solar cell devices were successful fabricated in this study.

ALPS-A3-03 15:45

Scintillation and Optical Properties of Ce^{3+}-doped Garnet-Type Crystals with Red Emission Band

Shunsuke Kurosawa
Tohoku University

Several Ce-doped garnet-type crystals were grown by the micro-pulling down method, and their optical and scintillation properties were evaluated. The samples had emission bands in the red and infrared regions excited by X-rays and alpha rays.

ALPS-A3-04 16:00

Optical and electronic properties of lithium hafnium chloride for dual neutron and gamma-ray detection

Chihaya Fujiwara[1], Shunsuke Kurosawa[1,2,3], Akihiro Yamaji[1,2], Yusuke Urano[1], Akira Yoshikawa[1,2,3]
[1]Institute for Materials Research, Tohoku University, [2]New Industry Creation Hatchery Center, Tohoku University, [3]Institute of Laser Engineering, Osaka University

A novel lithium hafnium chloride scintillator has been developed for dual neutron and gamma-ray detection. In this study, the luminescence and electronic properties of lithium hafnium chloride were clarified by experiment and DFT calculations.

ALPS <Room 413>

ALPS-J2-02 15:30

Two-Photon Gouy-Phase Singularity Generated by Spontaneous Parametric Down-Conversion using Higher-Order Radial Mode Pump Light

Takumi Jinushi, Hirokazu Kobayashi
Kochi University of Technology

We report coincidence measurement results suggesting the presence of a phase singularity in two-dimensional propagational-distance space of quantum-entangled photon-pairs generated by spontaneous parametric down-conversion using higher-order radial mode pump light.

ALPS-J2-03 15:45

Adaptive preparation of the input quantum state required for observing quantum contextuality

Kengo Matsuyama[1,2], Ming Ji[1,3], Holger Friedrich Hofmann[1], Masataka Iinuma[1]
[1]Hiroshima University, [2]Sony Semiconductor Kyushu Corporation, [3]The University of Hong Kong

We have demonstrated adaptive preparation of an initial entangled state optimized for observing quantum contextuality by local photon polarization measurements. This method is useful to optimize a setup in the presence of experimental imperfections.

ALPS-J2-04 16:00

Experimental investigation of single photon propagation by controlling both position and momentum

Yuki Seno, Hiroki Yamakami, Holger Friedrich Hofmann, Masataka Iinuma
Hiroshima University

Quantum interference permits simultaneous control of position and momentum beyond the conventional uncertainty limit. Here, we present experimental results on non-classical photon propagation obtained in a Sagnac interferometer.

Oral, Monday, 21 April PM

ICNNQ <Room 414+415>

[ICNNQ3] 15:30-17:00
Special Session: Advanced quantum light sources
Chair: Jonathan Finley
TU-Munich Walter Schottky Institute

ICNNQ3-01 15:30 ***Invited***

Semiconductor Quantum Light Sources for Long Distance Quantum Networking
Simone Luca Portalupi
University of Stuttgart
Photonic quantum technologies are currently in the focus of strong research efforts, with both fundamental and applied perspectives.

ICNNQ3-02 16:00 ***Invited***

Nanophotonic and Nanophononic Engineering for Defect Centers in Diamond
Kazuhiko Kuruma[1,2], Benjamin Pingault[2,3], Cleaven Chia[2], Michael Haas[2], Graham D Joe[2], Daniel Rimoli Assumpcao[2], Sophie Weiyi Ding[2], Chang Jin[2], C J Xin[2], Matthew Yeh[2], Neil Sinclair[2], Marko Lončar[2]
[1]The University of Tokyo, [2]Harvard University, [3]Delft University of Technology
We report on high-Q photonic crystal cavities at visible wavelengths in a thin film diamond and present the demonstration of diamond phononic crystals to control the spontaneous phonon processes in single color centers in diamond.

ICNNQ3-03 16:30

Two-photon emission from single-photon sources
Eduardo Zubizarreta Casalengua[1], Elena del Valle[2,3], Fabrice Pierre Laussy[4], Kai Müller[1]
[1]Walter Schottky Institut, School of Computation, Information and Technology, and MCQST, Technische Universität München, [2]Universidad Autónoma de Madrid, [3]Institute for Advanced Study, Technische Universität München, [4]Instituto de Ciencia de Materiales de Madrid ICMM-CSIC
The most fundamental source of quantum light is the two-level system. Under weak coherent excitation, its antibunched light is a consequence of the interference between the coherent and incoherent fractions of the emission. When the laser-emitter detuning is large, we show the strong correlations between the spectrum satellite peaks and demonstrate that two photons, one from each band, are emitted in a cascade.

ICNNQ3-04 16:45

Plasmon Enhanced Fiber In-Line Single Photon Source for Quantum Technologies
Muhammed Shafi Kodakkaden[1,2], Kali P Nayak[2]
[1]Hamad Bin Khalifa University, Qatar, [2]University of Electro-Communications, Tokyo
We present a fiber-integrated single-photon source using a single quantum dot and gold nanorod on an optical nanofiber, demonstrating its potential application as a quantum random number generator.

LSSE <Room 412>

[LSSE1] 15:30-17:30
Remote Sensing, LIDAR
Chair: Norihito Saito
RIKEN

LSSE1-01 15:30 ***Invited***

Features and latest trends of optical wireless power transmission
Tomoyuki Miyamoto
Institute of Science Tokyo
Optical Wireless Power Transmission (OWPT) uses laser beams and solar cells to provide long-distance, EMI-free power. Its high efficiency, diverse applications, and potential to reduce battery usage indicate significant promise for future development and scalability.

LSSE1-02 16:00 ***Invited***

Short-wavelength infrared spectroscopic and imaging observations for aurora and airglow in the Arctic.
Takanori Nishiyama[1], Masato Kagitani[2], Takuo T Tsuda[3], Yuki Iwasa[4], Tikemani Bag[1], Peter Dalin[5], Yasunobu Ogawa[1], Fred Sigernes[6]
[1]National Institute of Polar Research, [2]Planetary Plasma and Atmospheric Research Center, Graduate School of Science, Tohoku University, [3]Department of Computer and Network Engineering, University of Electro-Communications, [4]National Metrology Institute of Japan, National Institute of Advanced Industrial Science and Technology, [5]Swedish Institute of Space Physics, [6]University in centre Svalbard
We will present an overview of our new imaging spectrometer for ground-based measurements of aurora and airglow emissions in short-wavelength infrared regions (1.05 ~ 1.35 μm).

LSSE1-03 16:30 ***Invited***

Mars Atmosphere Explorations of Upper Atmosphere
Hiromu Nakagawa
Tohoku University
Mars is an important research target to understand the planetary environment that can preserve life. We demonstrate a newly designed a near-infrared laser heterodyne spectrometer to observe the upper atmosphere of terrestrial planets.

LSSE1-04 17:00 ***Invited***

LiDAR-based tidal monitoring system for reliable disaster-resilient
Tatsuya Fujimoto, Junichi Abe, Hidemi Noguchi, Yuta Koda
NEC Corporation
Our novel LiDAR method provides robust and stable tidal monitoring by utilizing 3D data, essential for disaster management. Demonstrations in Tokyo Bay validate its capability, achieving less than 2 cm measurement error at extended distances compared to conventional radar systems. This method's durability ensures operational continuity during seismic activities, providing a reliable alternative for disaster-prone regions.

OPTM <Room 213>

----- Coffee Break 15:30-15:45 -----

[OPTM2] 15:45-17:00
Metrology
Chair: Motoharu Fujigaki
University of Fukui

OPTM2-01 15:45

Separation Method of Support-Induced Deformation Errors for Optical Components Based on Rotation Calibration and Model Correction
Xiaochuan Hu[1,2,3], Xi Hou[1,2,3], Wei Huang[1,2,3], Yinhua Zhang[1,2,3], Yuancheng Zhao[1,2], Shuai Zhang[1,2]
[1]National Key Laboratory of Optical Field Manipulation Science and Technology, Chinese Academy of Sciences, Chengdu, Sichuan 610209, China, [2]Institute of Optics and Electronics, Chinese Academy of Sciences, Chengdu, Sichuan 610209, China, [3]University of Chinese Academy of Sciences, Beijing 100049, China
A method combining rotational calibration and finite element simulation separates support-induced deformation in high-precision optical components, improving surface accuracy measurements and enabling accurate surface shape extraction for enhanced manufacturing and testing performance.

OPTM2-02 16:00

Calibration method for broadband optical angle measurement
Hiraku Matsukuma, Sota Iguchi, Ryo Sato, Wei Gao
Tohoku University
Calibration method for broadband optical angle measurement which is based on autocollimation with broadband light source is proposed.

OPTM2-03 16:15

Proposal of an Error Correction Method for the Laser Triangulation Measurement on Optically Non-Cooperative Surfaces
Megumi Yamamoto[1], Marcus Petz[2], Rainer Tutsch[2]
[1]The University of Tokyo, [2]Technical University of Braunschweig
When an object with a specular reflection component is measured by a laser triangulation technique, errors due to aberrations occur because the entrance pupil of the lens is used non-uniformly. To solve this problem, we correct the spot focusing position based on the light intensity distribution at the entrance pupil of the lens, and the results show the usefulness of the proposed method.

OPTM2-04 16:30

Chromatic confocal microscopy with galvanometer scanning and CNN-based deconvolution for precise full-field surface profilometry
Wei-Chi Hung, Ching-Chia Yen, Han-Ju Tsai, Feng-Tse Chan, Liang-Chia Chen
National Taiwan University, Department of Mechanical Engineering
This study introduces a galvanometer-based chromatic confocal microscopy system with CNN-based deconvolution, achieving precise surface profilometry through reduced lateral bias and enhanced resolution, validated against calibrated standards and industrial samples.

OPTM2-05 16:45

Evaluation of the loss in measurements accuracy and spatial resolution in diffuse back-illumination extinction imaging
Julien Manin, Kevin Wan, Junghwa Yi
Sandia National Laboratories
Diffuse back-illumination extinction imaging (DBI-EI) uses diffuse light to mitigate beam steering effects caused by refractive index gradients, making it ideal for high-pressure, high-temperature environments. This study evaluates DBI-EI's measurement accuracy and spatial resolution loss, exploring how optical and experimental configurations affect performance, offering guidance for optimized setups.

SI-Thru <Room 419>

[SI-Thru2] 15:30-17:00
Wavefront Sensing and Adaptive Optics
Chair: Yoshihisa Takayama
Tokai University

SI-Thru2-01 15:30 ***Invited***

Computational Imaging with Randomness
Ryoichi Horisaki
The University of Tokyo
Computational imaging is a powerful framework that advances imaging systems by integrating optics and information science. In this talk, I will present our recent research on imaging through scattering media, leveraging the computational imaging framework.

SI-Thru2-02 16:00

Integrated Photonics for Wavefront Shaping in Near-Infrared and Visible
Filip Milojković[1,2], Niels Verellen[1], Frédéric Peyskens[1], Roelof Jansen[1], Mathias Prost[1], Xavier Rottenberg[1], Pol Van Dorpe[1,2]
[1]imec, Kapeldreef 75, 3001 Leuven, Belgium, [2]Department of Physics and Astronomy, KU Leuven, 3001 Leuven, Belgium
A silicon nitride integrated photonics platform for wavefront shaping in the near-infrared and visible is presented. We experimentally demonstrate focusing through tissue-like scattering samples using a one-dimensional optical phased array operating at the wavelength of 850 nm.

SI-Thru2-03 16:15

CIAO, a versatile and simple adaptive optics system for astronomy and satellite communication
Rakchanok Rungsawang, Guillaume Dovillaire, Cora Leveder
Imagine Optic
Imagine Optic has developed a simple, versatile, and affordable adaptive optics system dedicated to a telescope in the range of 0.3 to 1m diameter. We present the architecture of the existing prototype as well as the first experimental results.

SI-Thru2-04 16:30 ***Invited***

Data-Driven Design of Fourier-Based Wavefront Sensors
Esteban Vera, Benjamin Gonzalez, Rodrigo Muñoz, Nicolas Hernandez
Pontificia Universidad Católica de Valparaíso
We are developing a generalized Fourier-based wavefront sensor designing the optical coding element with a data driven approach, showing that no matter the starting point for the optical element, the sensor's response is dramatically improved.

Oral, Tuesday, 22 April AM

ALPS <Room 303>

[ALPS-C4] 9:00-10:00
High peak power lasers, high pulse energy lasers and applications (4)
Chair: Jumpei Ogino
Osaka University

ALPS-C4-01 9:00

1 kHz, 10 mJ amplifier based on Yb:CALGO

Fengchen Zhang[1,2,3], Geyang Wang[1], Wenlong Tian[1], Yang Yu[1], Yishan Wang[2,3], Zhiyi Wei[3], Jangfeng Zhu[1]
[1]School of Physics and Optoelectronic Engineering, Xidian University, [2]State Key Laboratory of Transient Optics and Photonics, Xi'an Institute of Optics and Precision,Mechanics, [3]University of Chinese Academy of Sciences

A two-stage amplifier delivered amplified pulses with the high energy of 10. 6 mJ. Thanks to the pulsed pump, the beam quality (M2) parameters <1.2 along each axis were maintained in each amplifier stage.

ALPS-C4-02 9:15

High-Energy KTA Optical Parametric Oscillator for Enhanced Hydrocarbon DIAL Detection in Urban Atmospheres

Taieb Gasmi
Saint Louis University-Madrid Campus

A high-energy KTA optical parametric oscillator (OPO) for DIAL applications operates in the 3.0–4.5 μm range with 0.2 nm linewidth, 6.5 mJ pulse energy, and <4.0% stability, enabling methane detection for atmospheric monitoring.

ALPS-C4-03 9:30

Detection of Laser-Induced Damage Onset by the Vibration (II)

Ryoichi Akiyoshi[1], Katsuhiro Mikami[2], Yasuhiro Miyasaka[3]
[1]Graduate School of Kindai University, [2]Kindai University, [3]Kansai Institute for Photon Science, National Institutes for Quantum Science and Technology

The variation of vibrational magnitude caused by laser-induced damage was demonstrated by changing thermal diffusion process. These results contribute to improving the performance of the proposed method for the prior to detection of damage.

ALPS-C4-04 9:45

Dynamics of Nanoscale Phase Decomposition in Laser Ablation Revealed by Femtosecond X-ray Scattering

Yanwen Sun
SLAC National Accelerator Laboratory

In this presentation, we combine time-resolved probing by intense femtosecond X-ray pulses with large-scale atomistic simulations to obtain unique insights into the ablation dynamics of thin gold films irradiated by femtosecond laser pulses.

ALPS <Room 413>

[ALPS-J3] 9:30-10:30
Photon source
Chair: Ryo Okamoto
Kyoto University

ALPS-J3-01 9:30 ***Invited***

Nanofiber photonics using electron beam methods

Mark Sadgrove
Tokyo University of Science

Optical nanofibers coupled to quantum emitters are an excellent candidate for next generation optical network nodes. Here, we detail a method allowing simultaneous characterization and utilization of these devices using electron beam induced luminescence.

Oral, Tuesday, 22 April AM

HEDS <Room 311+312>

[HEDS-OP] 9:00-9:10
Opening Remarks
Chair: Ryosuke Kodama
Osaka University

[HEDS1] 9:10-10:25
Radiative HED plasma
Chair: Natsumi Iwata
Osaka University

HEDS1-01 9:10 ***Invited***

Key Advancements Towards Eliminating the 'Drive Deficit' in ICF Hohlraum
Hui Chen
Lawrence Livermore National Laboratory
This talk is on the recent experiments at the National Ignition Facility that revealed the deficiencies of gold atomic calculations that counts for much of the longstanding "drive deficit" problem in NIF ICF simulations.

HEDS1-02 9:35 ***Invited***

Experimental Measurements of Gamma Photon Poduction and Estimation of Electron/Positron Production on the PETAL Laser Facility
Florent Brun[1], Lucas Ribotte[1,2,3], Guillaume Boutoux[2,3], Xavier Davoine[3,4], Paul Edouard Masson-Laborde[3,4], Yasuhiko sentoku[5], Natsumi Iwata[5], Natalie Blanchot[2], Dimitri Batani[1], Isabelle Lantuéjoul[3], Ludovic Lecherbourg[3,4], Bertrand Rosse[3], Christophe Rousseaux[3,4], Benjamin Vauzour[3], Didier Raffestin[1,2], Emmanuel D'Humières[1], Xavier Ribeyre[2]
[1]Centre Lasers Intenses et Applications, Univ. Bordeaux-CNRS-CEA, UMR 5107 Talence 33405, France, [2]CEA, DAM, CESTA, F-33116 Le Barp, France, [3]CEA, DAM, DIF F-91297 Arpagon, France, [4]Université Paris-Saclay, CEA, LMCE, 91680 Bruyères-le-Châtel, France, [5]Institute of Laser Engineering, Osaka University, 2-6 Yamadaoka, Suita, Osaka 565-0871, Japan
Experiments using PETAL (400J/600fs/8.10^{19} W.cm^{-2}) on solid targets were performed for its commissioning to produce gamma photons from bremsstrahlung. To analyse this experiment, we used a simulation chain. We also investigated numerically positron production by Bethe-Heitler and linear Breit-Wheeler using PETAL.

ICNNQ <Room 414+415>

[ICNNQ4] 9:30-10:30
Session 4
Chair: Toshiharu Saiki
Keio University

ICNNQ4-01 9:30 ***Invited***

Titanium-sapphire-on-insulator photonics for chip-scale laser systems
Kasper Van Gasse[1,2], Joshua Yang[3], Daniil Lukin[3], Melissa Guidry[3], Geun Ho Ahn[3], Alexander White[3], Jelena Vučković[3]
[1]Ghent University, [2]imec, [3]Stanford University
We demonstrate a titanium-sapphire-on-insulator (Ti:SaOI) platform for integrated photonics, enabling ultra-compact waveguides, amplifiers, and tunable lasers. Fabricated using a grinding-and-polishing technique, Ti:SaOI delivers on-chip pulse amplification with peak powers reaching 1 kW.

OMC <Room 418>

[OMC1] 9:00-10:15
Student Session 1
Chair: Yusuke Minowa
Kyoto University

OMC1-01 9:00

Circularly polarized luminescence in silver nanoclusters associated with chiral structural relaxation
Takuya Nakashima, Wataru Ishii
Osaka Metropolitan University
In the present study, we investigate circularly polarized luminescence (CPL) activity for an intrinsically chiral silver nanocluster (NC). The CPL activity of silver NC was discussed in association with possible chiral structural relaxation motion in the excited state.

OMC1-02 9:30

Laser-induced microdroplets: Generation, self-propelled motion, and manipulation via the solutal Marangoni effect
Shinya Hakuta, Masayuki Naya, Mamoru Sato, Jintaro Shiina, Toshiharu Saiki
Keio University
We propose a laser-driven platform that enables precise, non-contact generation and manipulation of microdroplets via solutal Marangoni effects. The droplets exhibit self-excited rotational and linear motion, offering novel applications in microrobotics and thermal management.

OMC1-03 9:45

Vortex Beam Generation Using Metamaterials for Chiral Particle Trapping and Manipulation
Hania ALTabbaa, Viet Giang Truong, Sile nicchormaic
OIST
Plasmonic tweezers have advanced nanoparticle trapping, but limitations persist. Using Tapered Arc Cyclic Group Symmetric Metasurfaces (TA-CGSMs), we generate vortex beams, enabling efficient trapping and rotation of liquid crystals. This approach extends to dynamic chiral nanocrystal manipulation, advancing optical tweezers and photonics.

OPTM <Room 213>

[OPTM3] 9:15-10:15
Polarization 1
Chair: Nathan Hagen
Utsunomiya University

OPTM3-01 9:15

Simultaneous image stacks collection with continuous rotating-compensator of imaging ellipsometers
Lianhua Jin[1], Yoriatsu Kitamura[1], Yoichi Sano[1], Daisuke Yamaguchi[1], Eiichi Kondoh[1], Yasuhiro Mizutani[2], Bernard Gelloz[3]
[1]University of Yamanashi, [2]Osaka University, [3]Nagoya University
A rotating-compensator ellipsometer collects modulated light signal simultaneously during continuous rotation of the compensator. We introduce the method of image stacks collection for the imaging ellipsometers based on the rotating-compensator principle.

OPTM3-02 9:30

Subwavelength Beam Shift at the Reflection of Orbital Angular Momentum-Induced Beam Generated by Vortex Retarder
Naila Zahra[1,2], Yasuhiro Mizutani[1], Tsutomu Uenohara[1], Yasuhiro Takaya[1]
[1]The University of Osaka, [2]Institut Teknologi Bandung
Recent findings show OAM-induced beams enhance detection of the subwavelength spin Hall effect of light shift. This study experimentally observes the shift during reflection of an OAM-induced beam created by a polarization-dependent vortex retarder.

OPTM3-03 9:45

Structural Chirality and Optical Properties of Scarabaeidae Beetles
Jessica Onaka, Ryuki Ishikawa, Manning Sun, Yukitoshi Otani
Utsunomiya University Center for Optical Research and Education
The colorful shiny surface of beetles' exoskeletons is of great interest for materials science as it shows interesting optical features. Both living and non-living specimens of Scarabaeidae beetles explore the temporal variation of their structural optical features.

Oral, Tuesday, 22 April AM

SI-Thru <Room 419>

[SI-Thru3] 9:00-10:45
Digital Holography
Chair: Esteban Vera
Pontificia Universidad Católica de Valparaíso

SI-Thru3-01 9:00 ***Invited***

Advanced Optical Imaging Beyond Scattering and Fluctuations: Waveguide-based Digital Holography and Single-Pixel Telescope
Eriko Watanabe[1], Shinjiro Kodama[1], Katsunari Okamoto[2], Yutaka Hayano[3], Mitsuo Takeda[4]
[1]The University of Electro-Communications, [2]Okamoto Laboratory, [3]National Astronomical Observatory of Japan, [4]Utsunomiya University
This paper introduces two imaging systems: a FIWI-based 3D holographic setup for imaging behind heterogeneous media and a deep learning-powered single-pixel telescope enabling simultaneous visible and near-infrared imaging through atmospheric fluctuations for astronomy.

SI-Thru3-02 9:30 ***Invited***

Harnessing randomness for fast polarization imaging
Rakesh Kumar Singh, Sourav Chandra
IIT BHU
This paper discusses polarization imaging by harnessing randomness and some of our recent contributions. Here, holography with second-order correlation of the randomness is used for polarization imaging. An experimental design to extract the SOP from second-order correlation analysis of the randomness in two channels is also introduced, and some experimental results are presented.

SI-Thru3-03 10:00

Multi-Parameter Computational 3D Imaging: Emphasizing Phase, Fluorescence and Polarization
Vishal Prajapati, Naru Yoneda, Osamu Matoba
Kobe University
This work presents a computational 3D imaging method combining phase, fluorescence, and polarization. Using a Liquid Crystal Cell and polarization control, it enables precise 3D reconstructions, benefiting applications like fluorescence microscopy and biological tissue analysis.

SI-Thru3-04 10:15

Recordable Time Extension in Light-in-Flight Recording by Holography with a Diffraction Grating Introduced into the Optical Path of the Object-Illuminating Light Pulse
Ryosei Yamada[1], Asuka Tsuji[1], Ryuki Yamaguchi[1], Tomoyoshi Inoue[1], Sudheesh Kumar Rajput[1], Kenzo Nishio[1], Toshihiro Kubota[2], Yasuhiro Awatsuji[1]
[1]Kyoto Institute of Technology, [2]Kubota Holography Laboratory Corporation
The recordable time of a motion picture in light-in-flight holographic microscopy is shortened due to the difference in the sweep speed of the object and reference light pulses on the recording plane. Then, we propose a method to extend the time with a diffraction grating introduced into the optical path of the object-illuminating light pulse.

XOPT <Room 313+314>

[XOPT-OP] 9:40-9:45
Opening Remarks

[XOPT1] 9:45-10:45
Facility
Chair: Takahiro Sato
SLAC National Accelerator Laboratory

XOPT1-01 9:45

On the Benefits of Small Emittance Storage Rings
Aymeric Robert
MAX IV Laboratory, Lund University
MAX IV Laboratory is the Swedish national synchrotron radiation facility that comprises three accelerators with varying characteristics.

XOPT1-02 10:00

An Overview of the SPring-8-II Upgrade Project
Makina Yabashi
RIKEN SPring-8 Center
An Overview of the SPring-8-II Upgrade Project is presented.

XOPT1-03 10:15 ***Invited***

Generation of high-power attosecond hard X-ray free-electron laser pulses at the European XFEL
Jiawei Yan
European XFEL
Attosecond pulses with wavelengths comparable to the atomic scales are expected to be a key tool in advancing attosecond science. In this presentation, we report the generation of high-power attosecond hard X-ray free-electron laser pulses using the self-chirping method.

NOTE

Oral, Tuesday, 22 April AM

ALPS <Room 303>

----- Coffee Break 10:00-10:15 -----

[ALPS-B1] 10:15-12:00
Solid-state lasers and applications
Chair: Hiroaki Furuse
NIMS

ALPS-B1-01 10:15 ***Invited***

Development and Demonstration of a Nanosecond Diode Pumped Solid State Laser Operating at 10 J, 100 Hz and Future Applications

Gary Quinn[1,2], Mariastefania De Vido[1], Danielle Clarke[1,2], Luke McHugh[1], Paul Mason[1], Jacob Spear[1], Jodie M. Smith[1], Martin Divoky[3], Jan Pilar[3], Ondrej Denk[3], Thomas J. Butcher[1], Chris Edwards[1], Tomas Mocek[3], John L. Collier[1]
[1]STFC Rutherford Appleton Laboratory, UK, [2]Heriot-Watt University, United Kingdom, [3]HiLASE Centre, Czech Republic

We report on stable, long-term amplification of nanosecond pulses to 10 J at 100 Hz with 25.4% optical-to-optical efficiency and 1% rms energy stability. We discuss future plans and applications of this technology.

ALPS-B1-02 10:45 ***Invited***

Multi-octave-spanning Field-resolved Infrared Spectroscopy Based on Single-Cycle Cr:ZnS Oscillators

Alexander Weigel[1,2,3], Philipp Steinleitner[1], Dionysios Potamianos[2,3], Aleksandar Sebesta[1,3], Daiki Okazaki[1,4], Mojtaba Aghakasiri[1,2], Pragya Verma[2,3], Amaj Chamankar[2], Behnam Abbasvand Jahedi[2], Sebastian Gröbmeyer[2,3], Ferenc Krausz[1,2,3]
[1]Max Planck Institute of Quantum Optics, Germany, [2]Ludwig-Maximilians-Universität München, Physics Institute, Germany, [3]Center for Molecular Fingerprinting, Hungary, [4]Kyoto University, Institute for Chemical Research, Japan

We present field-resolved infrared spectroscopy using the carrier-envelope-stable single-cycle outputs of two frequency-synchronized Cr:ZnS oscillators. Efficient down-conversion to the infrared provides simultaneous spectral coverage from 3 to 12 µm. We show further extension to the long-wave-infrared and the low-THz regime.

ALPS <Room 511+512>

[ALPS-A4] 10:00-11:15
Nano Materials and Structures
Chair: Fabian Rotermund
KAIST

ALPS-A4-01 10:00 ***Invited***

Ultra-low-loss Chalcogenide Glass Optical Waveguides and Resonators for On-chip Mid-infrared Photonics

Hansuek Lee
Korea Advanced Institute of Science and Technology

We present recent advances in on-chip ultra-low-loss waveguides and ultra-high-Q resonators made of various chalcogenide glasses, detailing their design, fabrication process, and application results, including Brillouin lasing and supercontinuum generation, in the mid-infrared wavelength range.

ALPS-A4-02 10:30

Modification of lumiescent properties of carbon dots by synthesis parameters

Robert Tomala, Natalia Jastrzebska, Daniela Kujawa, Pawel Gluchowski, Mateusz Oleszko, Oleksii Bezkrovnyi
Institute of Low Temperature and Structure Research PAS

The influence of synthesis conditions on the tunability of carbon dots' spectroscopic properties, such as absorption, emission color, and emission efficiency, is discussed, along with possible applications as WLED phosphor or anticounterfeiting.

ALPS-A4-03 10:45

Multifunctional carbon dots: synthesis, characterization, applications

Paweł Głuchowski[1], Daniela Kujawa[1], Anna Grzegórska[2], Anna Zielinska-Jurek[2], Marzena Fandzloch[1], Robert Tomala[1]
[1]Institute of Low Temperature and Structure Research, Polish Academy of Sciences, [2]Faculty of Chemistry, Gdansk University of Technology

This study reviews luminescent and phosphorescent carbon dots, emphasizing synthesis, structure, and luminescence principles. It explores their morphology, optical properties, and photocatalytic activity, focusing on applications in anti-counterfeiting and photocatalysis through tunable optical characteristics.

ALPS-A4-04 11:00

Exploring hybrid nanomaterials: gold nanoshells and chalcones for advanced optical properties and excited-state absorption

Marta Dominika Gordel-Wójcik[1], Muhammed Thottappali[2], Marek Pietrzak[3], Jiří Vohlídal[4], Jiří Pfleger[2], Beata Jędrzejewska[3]
[1]Faculty of Chemistry, University of Wrocław, 14.p F. Joliot-Curie Street, 50-383, Wrocław, Poland, [2]Department of Polymers for Electronics and Photonics, Institute of Macro-molecular Chemistry Czech Academy of Sciences Heyrovského nám. 2, 16206 Prague 6, Czech Republic, [3]Faculty of Chemical Technology and Engineering, Bydgoszcz University of Science and Technology, Seminaryjna 3, 85-326 Bydgoszcz, Poland, [4]Department of Physical and Macromolecular Chemistry, Faculty of Science, Charles University, Prague, Czech Republic

The study of excited-state absorption in stable, colloidal hybrid materials based on gold nanoshells and chalcones revealed strong interactions between their components. These interactions resulted in prolonged emission lifetimes and enhanced emission efficiency.

ALPS <Room 413>

ALPS-J3-02 10:00

Low-loss spatial multiplexing of heralded single photons at a telecom band

Takuyu Miyagawa[1], Taichi Takara[2,3], Fumihiro Kaneda[1,3,4]
[1]Department of Physics, Graduate School of Science, Tohoku University, [2]Department of Electrical Engineering, Graduate School of Engineering, Tohoku University, [3]Research Institute of Electrical Communication, Tohoku University, [4]Precursory Research for Embryonic Science and Technology, Japan Science and Technology Agency

We demonstrate the spatial multiplexing of heralded single-photon generation utilizing a low-loss electro-optic router. We observed the enhancement of the multiplexed single-photon generation probability overcoming the loss of the router.

ALPS-J3-03 10:15

Development of two identical frequency-multiplexed photon pair sources for long-distance quantum communication

Takuto Nihashi[1], Tomoki Tsuno[1,3], Hiroki Tateishi[1], Daisuke Yoshida[1,3], Koji Nagano[2,3], Daisuke Akamatsu[1], Feng-Lei Hong[1,2], Tomoyuki Horikiri[1,2,3]
[1]Yokohama National University, [2]IMS, Yokohama National University, [3]LQUOM, Inc

We report on the latest developments in cavity two-photon sources, designed to generate photons to be coupled with frequency-multiplexed quantum memories for creating entanglement between distant locations.

----- Coffee Break 10:30-10:45 -----

[ALPS-F1] 10:45-12:00
Terahertz orbital angular momentum and quantum applications
Chair: Yu Tokizane
Tokushima Univ.

ALPS-F1-01 10:45 ***Invited***

Encyped Thz Security Keys Leveraging Orbital Angular Momentum Encoding

Martin Philip John Lavery[1], Adam Valles[2,3,4], Katsuhiko Miyamoto[2]
[1]University of Glasgow, [2]Chiba University, [3]Universitat Politècnica de Catalunya, [4]Institut de Ciències Fotòniques

We present an exciting new approach to supply chain security that leverages a hidden key that is deciphered when selectively illuminated with structured THz beams carrying Orbital Angular Momentum (OAM). The key comprises arrays of low-complexity apertures that uniquely distort incident OAM fields, which are subsequently decoded by machine learning and tracked through online digital verification.

FAAP <Room 412>

[FAAP2] 10:00-12:00
Keynote 2
Chair: Satoshi Wada
RIKEN

FAAP2-01 10:00 ***Invited***

Developing Technologies to Unravel the Microbial World at the Single-Cell Level

Haruko Takeyama
Waseda University

Agricultural soils host diverse microbes that interact with crops. To elucidate their functions, we apply omics approaches. Given culturing challenges, single-cell analysis enables the discovery of novel microbial functions. This talk presents technologies and findings from single-cell omics analyses.

FAAP2-02 11:00 ***Invited***

Quantifying the Subjective Quality of Agricultural Products with Spectral Sensing: The Case of Freshness and Sensory Attributes

Akifumi Ikehata
NARO

This study used near-infrared (NIR) spectroscopy to evaluate tomato taste/texture and cabbage freshness, modeling sensory attributes and storage changes. Results highlight its potential for objective fruit and vegetable quality assessment.

Oral, Tuesday, 22 April AM

HEDS <Room 311+312>

HEDS1-03 10:00 *Invited*

Collimated gamma-ray emission enabled by efficient direct laser acceleration

Alexey Arefiev[1], Kavin Tangtartharakul[1], Gaetan Fauvel[2], Talia Meir[3], Florian Condamine[2], Stefan Weber[2], Ishay Pomerantz[3], Mario Manuel[4]
[1]University of California San Diego, USA, [2]ELI Beamlines Facility, Czech Republic, [3]Tel Aviv University, Israel, [4]General Atomics, San Diego, USA

We investigate the mechanisms responsible for single- and double-lobed gamma-ray emission profiles in laser-irradiated plasmas, focusing on the role of direct laser acceleration (DLA). Efficient DLA produces single-lobed profiles dominated by plasma magnetic fields, while inefficient DLA leads to double-lobed emission influenced by laser fields. Lower-density targets favor efficient DLA, transforming the emission profile.

----- Coffee Break 10:25-10:40 -----

[HEDS2] 10:40-11:50
WDM and dense plasma
Chair: Nicholas Hartley
Stanford University

HEDS2-01 10:40 *Invited*

Femtosecond X-ray Imaging of Isochorically Heated Solid-Density Plasmas with XFELs

Hiroshi Sawada[1], Toshinori Yabuuchi[2,3], Naoki Higashi[4], Tadahiro Iwasaki[4], Koki Kawasaki[4], Yuto Maeda[4], Tomohiro Izumi[4], Yoshiharu Nakagawa[4], Keisuke Shigemori[4], Youichi Sakawa[4], Chandra Curry[5,6], Mungo Frost[5], Natsumi Iwata[4], Tadashi Ogitsu[7], Keisuke Sueda[3], Tadashi Togashi[2,3], SuXing Hu[8], Siegfried Glenzer[5], Andreas Kemp[7], Yuan Ping[7], Yasuhiko Sentoku[4]
[1]University of Nevada, Reno, [2]Japan Synchrotron Radiation Research Institute, [3]RIKEN Spring-8 Center, [4]Institute of Laser Engineering, Osaka University, [5]SLAC National Accelerator Laboratory, [6]University of Alberta, [7]Lawrence Livermore National Laboratory, [8]Laboratory for Laser Energetics, University of Rochester

We report femtosecond, micron-scale imaging of isochorically heated solid-density copper foils using XFELs, revealing heat front propagation, electron temperature, and ionization states, advancing understanding of fast electron heating and dense plasma dynamics for fast ignition.

HEDS2-02 11:05 *Invited*

Warm dense matter and relativistic plasma research at the HED-HiBEF instrument at EuXFEL

Alejandro Laso Garcia[1], Motoaki Nakatsutsumi[2], Karen Appel[2], Sebastian Göde[2], Zuzana Konôpková[2], Olliver Humphries[2], Thomas Preston[2], Mikhail Mishchenko[2], Michal Andrzejewski[2], Minxue Tang[2], Rahul Sripati Venkata[2], Erik Brambrink[2], Carolina Camarda[2], Khachiwan Buakor[2], Anand Dwivedi[2], Dmitrii Bespalov[2], Alexander Pelka[1], Hauke Höppner[1], Cornelius Strohm[3], Rachel Husband[3], Carsten Bähtz[1], Ulf Zastrau[2], Toma Toncian[1]
[1]Helmholtz-Zentrum Dresden-Rossendorf, [2]European XFEL, [3]Deutsches Elektronen Synchrotron DESY

Here, we present the status of the High Energy Density – Helmholtz International Beamline for Extreme Fields instrument at the European X-Ray Free Electron laser. We will introduce the instrument and the high-power laser drivers available. We will show experimental results using the XFEL beam to probe solid density plasmas with high spatial resolution (~nm) and high temporal resolution (~10s fs).

ICNNQ <Room 414+415>

ICNNQ4-02 10:00

Hybrid nanocavity via dielectric environment engineering with 2D materials

Chee Fai Fong[1], Daiki Yamashita[1,2], Nan Fang[1], Shun Fujii[3,1], Yih-Ren Chang[1], Takashi Taniguchi[4], Kenji Watanabe[4], Yuichiro K. Kato[1]
[1]RIKEN, [2]AIST, [3]Keio University, [4]NIMS

Two-dimensional (2D) layered materials are gaining prominence in hybrid photonics. While ultrathin, the presence of a 2D material flake can still alter its dielectric environment. We demonstrate self-aligned hybrid nanocavities where 2D material flakes locally define cavities along photonic crystal waveguides after fabrication.

ICNNQ4-03 10:15

Exploring the limits of absolute position accuracy in single emitter localization microscopy

Chenxi Ma[1], Maximilian Heller[1], Timon Handrup[1], Yiteng Zhang[1], Xian Zheng[1], Michael Zopf[1,2], Fei Ding[1,2]
[1]Leibniz University Hannover, Institute of Solid State Physics, [2]Leibniz University Hannover, Laboratory of Nano and Quantum Engineering

We evaluate the accuracy of the optical positioning technique for solid-state single photon emitters and develop a calibration model that minimizes systematic errors and improves the yield of quantum photonic device integration.

----- Coffee Break 10:30-10:45 -----

[ICNNQ5] 10:45-11:45
Session 5
Chair: Satoshi Iwamoto
The University of Tokyo

ICNNQ5-01 10:45 *Invited*

Assembly of Photonic Crystal Devices Using Mechanically Guided Transfer Printing

Tsan-Wen Lu, Huai-Chang Chen, Chang-Chi Jung, Chien-Chen Chang, Yu-Chen Lin, Po-Tsung Lee
National Yang Ming Chiao Tung University

We utilize mechanically guided transfer printing to assemble various photonic crystal nanolasers for photonic integrated circuits, including nanobeam lasers that achieve unidirectional coupling to silicon-based waveguides and nanolasers featuring ultranarrow slots.

OMC <Room 418>

OMC1-04 10:00

Rapid Collection and Optical Measurement of Fluorescent Nano-Quantum Sensors by Photothermal Assembly

Keita Suzuki[1,2,3], Shuichi Toyouchi[1,2], Kota Hayashi[1,2,3], Mamoru Tamura[2,4], Chihiro Suzuki[5], Kiichi Kaminaga[5], Ryuji Igarashi[5,6], Shiho Tokonami[2,3], Takuya Iida[1,2]
[1]Department of Physics, Graduate School of Science, Osaka Metropolitan University, [2]Research Institute for Light-Induced Acceleration System, Osaka Metropolitan Universuty, [3]Department of Materials Science, Graduate School of Science, Osaka Metropolitan University, [4]Department of Materials Engineering Science, Graduate School of Engineering Science, Osaka University, [5]Institute for Quantum Life Science, National Institutes for Quantum Science and Technology, [6]School of Life Science and Technology, Institute of Science Tokyo

Fluorescent nanodiamonds dispersed in a liquid were collected and assembled by photothermal convection. The changes in the fluorescent area and the assembly efficiency of ring-like assembled structures were related to the concentration of nanodiamonds.

----- Coffee Break 10:15-10:45 -----

[OMC2] 10:45-12:00
Student Session 2
Chair: Takuya Nakashima
Osaka Metropolitan University

OMC2-01 10:45 *Invited*

High-power multi-wavelength vortex laser generation in diamond

Zhenxu Bai[1,2,3], Hui Chen[1,2,3], Jie Ding[1,2,3], Yulei Wang[1,2,3], Takashige Omatsu[4], Richard P. Mildren[5], Zhiwei Lu[1,2,3]
[1]Center for Advanced Laser Technology, Hebei University of Technology, [2]Hebei Key Laboratory of Advanced Laser Technology and Equipment, [3]Collaborative Innovation Center for Diamond Laser Technology and Applications, [4]Molecular Chirality Research Center, Chiba University, [5]MQ Photonics Research Centre, Department of Physics and Astronomy, Macquarie University

A cascaded diamond Raman vortex laser with dual-wavelength emission at 1240 nm and 1485 nm is demonstrated, achieving 42 W and 22 W outputs with conversion efficiencies of 15.3% and 5.8%, highlighting its high-power vortex generation potential.

OPTM <Room 213>

OPTM3-04 10:00

Application of Fisheye Lenses in Sky Polarization Measurement and Its Compensation Method

Manning Sun, Wataru Nakagaito, Nathan Hagen, Yukitoshi Otani
Center for Optical Research and Education, Utsunomiya University

Fisheye lenses enable wide-field sky polarization measurements but cause complex polarization transformations. This study uses Stokes parameters and Mueller matrices to compensate for these effects. A pixel-level Mueller matrix model corrects polarization distortions, providing a foundation for accurate sky polarization measurement.

----- Coffee Break 10:15-10:30 -----

[OPTM4] 10:30-12:00
Polarization 2
Chair: Lianhua Jin
University of Yamanashi

OPTM4-01 10:30 *Invited*

Non-conventional illumination and detection imaging architectures

Genaro Saavedra Tortosa[1], Manuel Martinez-Corral[1], Chrysanthe Preza[2]
[1]3D Imaging and Display Laboratory, Universitat de València, Spain, [2]Computational Imaging Research Laboratory, The University of Memphis, TN, USA

Conventional imaging using uniform illumination and pixelated detectors presents strong limitations in some challenging scenarios, as dealing with 3D objects or transparent samples. To overcome these drawbacks, we present here some novel proposals by using nonconventional illumination/detection architectures.

OPTM4-02 11:00

Demonstration of a Snapshot Mueller Matrix Channeled Spectropolarimeter

Shaun Ethan Chaudhury Phangcho, Nathan Hagen
Utsunomiya University

We present the design, calibration and results obtained from a snapshot Mueller matrix channeled spectropolarimeter and compare them with a conventional Mueller matrix polarimeter. We discuss ongoing work and future plans.

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SI-Thru <Room 419>

SI-Thru3-05 10:30

Digital holographic sound field measurement for on-line processing

Nao Sakiyama[1], Naru Yoneda[1,2], Yasuhiro Awatsuji[3], Osamu Matoba[1,2]
[1]Kobe University, [2]Kobe University Center of Optical Scattering Image Science, [3]Kyoto Institute of Technology

Digital holography is applied to visualize sound field and has features such as high spatial resolution and non-invasiveness to the objects. Conventionally, holograms are recorded in experiments and sound waves are numerically reconstructed by off-line processing. In this study, we attemped to build a system to reconstruct the sound field by on-line processing and to visualize the results immediately.

----- Coffee Break 10:45-11:00 -----

[SI-Thru4] 11:00-11:45
Scattering Measurement
Chair: Goro Nishimura
Hokkaido University

SI-Thru4-01 11:00 ***Invited***

Fluctuation in Scattering: Dynamic Light Scattering

Takashi Hiroi
Shibaura Institute of Technology

Fundamentals and applications of dynamic light scattering, which is the technique to measure the fluctuation of scattered light intensity originating from Brownian motion of scatterers, is introduced.

SI-Thru4-02 11:30

Probing molecular fluctuation in live cell nuclei by analyzing dynamic light scattering using interferometric scattering correlation spectroscopy

Yi-Teng Hsiao[1], Ka Lok Wong[1], I-Hsin Liao[1], Chia-Lung Hsieh[1,2]
[1]Institute of Atomic and Molecular Sciences, Academia Sinica, [2]Department of Physics, National Taiwan University

We present a label-free imaging technique using interference microscopy to probe nanoscale molecular fluctuations in living cell nuclei. Correlation analysis of dynamic light scattering signals enables spatially resolved diffusion and density measurements with sub-millisecond resolution.

XOPT <Room 313+314>

----- Coffee Break 10:45-11:10 -----

[XOPT2] 11:10-11:55
Optics (I)
Chair: Kawal Sawhney
Diamond Light Source

XOPT2-01 11:10

Development of Nano-focus Capability and Applications at the XPP instrument at LCLS

Takahiro Sato[1,2], Ichiro Inoue[2], Matthew Seaberg[1], Yanwen Sun[1,2], Diling Zhu[1,2], Boyang Zhao[3], Youngjun Ahna[3], Meredith Henstridge[1], Matthias Hoffmann[1], Selene She[1], Alex Halavanau[1], River Robles[1], David Ceaser[1], Agostino Marinelli[1], Haidan Wen[3], Yasuhisa Sano[4,2], Kazuto Yamauchi[4,2], Makina Yabashi[2,5], Jumpei Yamada[4,2]
[1]Linac Coherent Light Source, SLAC National Accelerator Laboratory, [2]RIKEN SPring-8 Center, RIKEN, [3]Argonne National Laboratory, [4]Graduate school of Engineering, Osaka University, [5]Japan Synchrotron Radiation Research Institute

The XPP instrument started development works for future nano-probe and full field imaging capabilities targeting the future high repetitition rate upgrade, which includes chromatic aberration free nano-focus, full-field imaging and scanning nano-diffraction. We perfomed single shot full field imaging and time/spatial resolved nano-diffraction experiments by combining an AKB mirror system and ultrafast X-rays from LCLS and demosntrated.

XOPT2-02 11:25

Manufacturability-based optical design optimization for advanced Kirkpatrick–Baez X-ray focusing mirrors

Lei Huang[1], Tianyi Wang[1], Jumpei Yamada[2], Luca Rebuffi[3], Corey Austin[1], Heejoo Choi[4], Hyukmo Kang[4], Vipender Negi[4], Daewook Kim[4], Mourad Idir[1]
[1]Brookhaven National Laboratory, [2]Osaka University, [3]Argonne National Laboratory, [4]University of Arizona

We propose an Advanced Kirkpatrick–Baez (AKB) mirror design optimization approach to mitigate the difficulties associated with mirror fabrication by minimizing the total slope ranges of the four curved mirrors while achieving the expected focusing performance. The optimization results provide valuable insights into areas where trade-offs must be considered. Simulations validate the optimized AKB design showing high tolerance to the beam incident angle.

NOTE

Oral, Tuesday, 22 April AM

ALPS <Room 303>

ALPS-B1-03 11:15 *Invited*

High-power holmium-based solid-state ultrafast lasers

Michael Müller[1,2], Anna Suzuki[2], Boldizar Kassai[2], Yicheng Wang[2], Clara J. Saraceno[2]
[1]RayVen Laser, [2]Ruhr University Bochum

We present an ultrafast holmium-based regenerative amplifier delivering 112 µJ pulse energy and 11 W average power at 2.1 µm wavelength on the route to commercialization. The power scaling potential of the technology and first material processing tests are discussed.

ALPS-B1-04 11:45

Fabrication and Optical Properties of Transparent Er:$(Y, La)_2O_3$ ceramic

Zehao Xu[1,2], Hiroaki Furuse[2], Tohru Suzuki[1,2]
[1]Waseda University, [2]National Insititute for Materials Science (NIMS)

$Er_{0.063}:(Y_{0.89}La_{0.11})_2O_3$ ceramic was fabricated by spark plasma sintering at 1300°C. The in-line transmittance exceeds 82% at the wavelength of 2800 nm, which demonstrates that the ceramic is promising for laser applications.

----- Lunch 12:00-13:00 -----

[ALPS-D1] 13:00-14:00
Semiconductor laser devices
Chair: Kazuyuki Uno
Yamanashi Univ.

ALPS-D1-01 13:00

Optimized Butt-Joint Growth of 100 Gb/s Electro-Absorption Modulated Laser

Mengyang Zhong[1,2,3,4], Huan Li[2,3,4], Yueying Niu[2,3,4], Defan Sun[2,3,4], Yanrong Song[1], Song Liang[2,3,4], Daibing Zhou[2,3,4]
[1]School of Physics and Optoelectronic Engineering, Beijing University of Technology, [2]Key Laboratory of Optoelectronic Materials and Devices, Institute of Semiconductors, Chinese Academy of Sciences, [3]Center of Materials Science and Optoelectronics Engineering, University of Chinese Academy of Sciences, [4]Beijing Key Laboratory of Low Dimensional Semiconductor Materials and Devices

We report a 100 Gb/s electro-absorption modulated laser fabricated using optimized butt-joint growth, demonstrating excellent transmission performance with clear eye diagrams over various distances.

ALPS-D1-02 13:15

1.3-µm Reflection Insensitive High-speed Directly Modulated DFB Laser Having a MQW Based DBR Section

Huan Li[1,2,3], Mengyang Zhong[1,3], Xinkai Xiong[1,2,3], Daibing Zhou[1,2,3], Dan Lu[1,2,3], Song Liang[1,2,3]
[1]Institute of Semiconductors, CAS, [2]University of Chinese Academy of Sciences, [3]Beijing Key Laboratory of Low Dimensional Semiconductor Materials and Devices

We report a low cost 1.3 µm directly modulated InGaAlAs/InP DFB laser which has an over 28 GHz modulation bandwidth and a high immunity to external optical feedback at the same time.

ALPS <Room 511+512>

----- Lunch 11:15-13:00 -----

[ALPS-A5] 13:00-14:15
Advanced Fabrications and Techniques
Chair: Valentin Petrov
Max Born Institute

ALPS-A5-01 13:00

Optical Properties of Stacked Metasurfaces Exhibiting Out-of-Plane Quadrupole Resonance and its Application for Photoluminescence Control

TienYang Lo, Shunsuke Murai, Taiki Takashima, Katsuhisa Tanaka
Kyoto University, Japan

This study investigated the role of inter-layer interaction in modulating resonance characteristics of stacked metasurfaces exhibiting out-of-plane quadrupole resonance with varying separation distances and their direct impact on the photoluminescence of the emitters sandwiched between.

ALPS-A5-02 13:15

Fabrication of Bowtie-like Micro Surface Structure by Optical Vortex Laser Ablation in Liquid

Haruki Kawaguchi[1,2], Ryo Yasuhara[1,2], Haotian Yang[2], Reina Miyagawa[1,3], Koji Sugioka[4], Masato Ota[1,2], Hiyori Uehara[1,2]
[1]National Institute for Fusion Science, National Institutes of Natural Sciences, [2]The Graduate University for Advanced Studies, SOKENDAI, [3]Department of Physical Science and Engineering, Nagoya Institute of Technology, [4]RIKEN, Center for Advanced Photonics

We proposed femtosecond optical vortex laser ablation in liquids, successfully fabricating asymmetric bowtie-like microstructures. This technology offers applications in functional materials, microdevices, and new insights into laser processing.

ALPS <Room 413>

ALPS-F1-02 11:15

THz vector and scalar vortex beams generation by optical rectification in zinc blende crystals

Yaqun Liu, Valdas Pasiskevicius
KTH Royal Institute of Technology

THz vector vortex generation based on optical rectification along three-fold axis of zincblende was demonstrated. Vector vortex THz beam manipulation and the conversion to scalar THz vortex beams were shown.

ALPS-F1-03 11:30

THz-wave phase detection with backward optical parametric conversion toward quantum interference experiments

Yuto Yoneda[1,2], Yuma Takida[2], Joselito E. Muldera[2], Alexander De Los Reyes[2], Deepika Yadav[2], Hiroaki Minamide[1,2]
[1]Chiba University, [2]RIKEN

Using the THz-wave phase detection with a backward THz-wave parametric oscillation (BW-TPO) process, we have elucidated the transfer of phase information in a special interaction field between counter-propagating THz and near-infrared waves.

ALPS-F1-04 11:45

Mid-infrared Photon Detection And its Applications Based on Quantum Frequency Transducer

Zhao-Qi-Zhi Han, Zhi-Yuan Zhou, Bao-Sen Shi
University of Science and Technology of China

Mid-infrared photons are converted to the visible band and detected using mature silicon-based detectors. The characteristics of these processes have been studied and applied to the preparation of mid-infrared entanglement sources and target measurements.

----- Lunch 12:00-13:30 -----

FAAP <Room 412>

FAAP2-03 11:30 *Invited*

Future of Agriculture and Advanced Photonics

Satoshi Wada
RIKEN

As the Conference Chair, I am pleased to introduce the FAAP2025 conference, which will focus on advancements in optical technology in agriculture and its integration with other scientific fields, providing a platform for discussing research and development while considering the agricultural environment and conditions.

----- Lunch 12:00-13:00 -----

[FAAP3] 13:00-15:00
Session 3
Chair: Shigeharu Moriya
RIKEN

FAAP3-01 13:00 *Invited*

Transforming Agriculture with LED Lighting: Advancing Precision Farming and Sustainability through Photonics

Edwin Ong
ARIANETECH PTE LTD

The strategic use of LED lighting in vertical farming enhances crop yields, reduces energy consumption, and optimizes growth cycles, creating a sustainable and profitable business model while advancing precision farming and environmental resilience through photonics.

Oral, Tuesday, 22 April AM

HEDS <Room 311+312>

HEDS2-03 11:30

Ultrafast surface ablation and nano-structuring dynamics studied via grazing-incidence XFEL scattering

Motoaki Nakatsutsumi[1], Klaus Sokolowski-Tinten[2], Lisa Randolph[1,3], Thies Johannes Albert[2], Sebastian Göde[1], Lingen Huang[4], Dominik Kaczmarek[2], Dmitriy Ksenzov[5], Thomas Kluge[4], Mikako Makita[1], Özgül Öztürk[5], Thomas Preston[1], Sripati Venkata Rahul[1], Toshinori Yabuuchi[6], Christian Gutt[5], Jörn Bonse[7]
[1]European XFEL, 22869 Schenefeld, Germany, [2]Univ. Duisburg–Essen, Duisburg, 47048, Germany, [3]Forschungszentrum Jülich, 52428, Jülich, Germany, [4]Helmholtz-Zentrum Dresden-Rossendorf, 01328 Dresden, Germany, [5]Department Physik, Universität Siegen, 57072 Siegen, Germany, [6]Japan Synchrotron Radiation Research Institute (JASRI), Sayo, Hyo 679-5198, Japan, [7]Bundesanstalt für Materialforschung und -prüfung (BAM), D-12205 Berlin, Germany

We developed grazing-incidence XFEL method combining GISAXS and GID to visualize ultrafast nanoscale surface and sub-surface dynamics following laser ablation, enabling insights into laser-induced periodic surface structures (LIPSS) formation and comparisons with advanced simulation theories.

----- Lunch 11:50-13:30 -----

ICNNQ <Room 414+415>

ICNNQ5-02 11:15

Formation and optical characteristics of AlGaN:Tb/GaN core-shell nanowires grown by organometallic vapor phase epitaxy

Jun Tatebayashi[1], Takuma Yoshimura[1], Kazuhisa Sato[1], Shuhei Ichikawa[1], Yasufumi Fujiwara[2]
[1]The University of Osaka, [2]Ritsumeikan University

We report on the formation and optical characteristics of AlGaN:Tb/GaN core-shell nanowires grown by organometallic vapor phase epitaxy. Room-temperature luminescence at the visible regime consisting of blue, green, yellow and red is observed from Tb ions doped in AlGaN shells grown on GaN core NWs.

ICNNQ5-03 11:30

Spectral and Spatial Confinement of Whispering Gallery Modes in Precision-Engineered Microbubble Cavities

Ramgopal Madugani, Amal Jose, Síle Nic Chormaic
Okinawa Institute of Science and Technology Graduate University

Microbubble resonators, ideal for sensing due to their hollow cores enabling light-matter interactions, face challenges from dense spectra. We address this by creating geometric surface filters, isolating modes, and enhancing spatial confinement for improved sensing applications.

----- Lunch 11:45-13:45 -----

OMC <Room 418>

OMC2-02 11:15

Exploring orthogonally polarization nonplanar circular modes in solid-state lasers

Yu-Han Fang, Xin-Liang Zheng, Kai-Xiang Hu, Hsing-Chih Liang, Yung-Fu Chen
National Yang Ming Chiao Tung University, Taiwan

An analytical representation is established to explore polarization-resolved components of the NCM by utilizing the Gaussian wave packet to make a comparison with experimental results.

OMC2-03 11:30

Star-shaped synchronous mark design based on the collinear holographic data storage system

Ruying Xiong[1], Hongjie Liu[1], Xu Zheng[1], Shujun Zheng[1], Lin Peng[1], Xueyan Chen[1], Xiao Lin[1,2,3], Xiaodi Tan[1,2,3]
[1]Fujian Normal University, [2]Fujian Provincial Key Laboratory of Photonics Technology, [3]Key Laboratory of Opto-Electronic Science and Technology for Medicine of Ministry of Education

In the collinear holographic data storage system, synchronous marks are used for positioning to avoid data misalignment. In this paper, we propose a star-shaped synchronous mark, which improves the holographic grating coupling efficiency.

OMC2-04 11:45

Pulsed geometric modes with switchable orthogonal polarization by an Nd:YVO_4/Cr^{4+}:YAG laser in a concave-convex resonator

Pi-Hui Tuan, Wei-Ru Chen
National Chung Cheng University

Pulsed geometric modes with overall peak power higher than 400 W and the orthogonal polarization basis to be flexibly and sharply switched by merely tuning the cavity length were achieved by a c-cut Nd:YVO_4/Cr^{4+}:YAG laser.

----- Lunch 12:00-13:10 -----

[OMC3] 13:10-15:00
Session 1
Chair: Takashige Omatsu
Chiba University

OMC-OP 13:10

Opening Remarks

OMC3-01 13:15 ***Invited***

Micro and nanoplastics detection in seawater and complex environments

Giovanni Volpe
CNR – IPCF

I will first review methodologies and gaps in the analysis of MNPs.

OPTM <Room 213>

OPTM4-03 11:15

Snapshot partial Muller matrix imaging using spatial optical phase modulator

Shin Nakui, Jessica Onaka, Yukitoshi Otani
Utsunomiya University

A snapshot partial Muller matrix imaging method is proposed using a spatial optical phase modulator and a polarization camera. This approach, free of mechanical components, demonstrates imaging of the partial Muller matrix.

OPTM4-04 11:30 ***Invited***

Hybrid AFM-interference microscope

Gaoliang Dai[1], Rainer Tutsch[2]
[1]PTB, [2]TU Braunschweig

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SI-Thru <Room 419>

----- Lunch 11:45-13:30 -----

[SI-Thru5] 13:30-15:00
Computational Imaging
Chair: Yasuhiro Awatsuji
Kyoto Institute of Technology

SI-Thru5-01 13:30 ***Invited***

Wavefront Shaping of Ultrashort Optical Pulses and Application to Time-Resolved Spectroscopy
Kaoru Ohta
Kobe University
In this work, we present a proof-of-principle study for time-resolved optical spectroscopy through a thin scattering medium. The key idea of our method is to focus only the pump pulse onto a target position using wavefront shaping in the spatial domain, while the unoptimized speckle pattern of the beam serves as the probe pulse.

XOPT <Room 313+314>

XOPT2-03 11:40

Metrology and manufacture of X-ray reflective optics with nanometer accuracy
Qiushi Huang, Zhanshan Wang, Pengfeng Sheng
Tongji University
Stitching interferometry and various deterministic techniques were developed for the fabrication of X-ray mirrors. Reference and distortion errors were studied and calibrated. Stitching interferometry was further combined with CGH for the the measurement of toroidal mirrors. Plane mirror with 650mm length was manufactured with 1nm RMS height error and 100nrad slope error. Toroidal mirror with 310nrad slope error was also manufactured.

----- Lunch 11:55-13:25 -----

[XOPT3] 13:25-14:55
Optics (II)
Chair: Lei Huang
Brookhaven National Laboratory

XOPT3-01 13:25 ***Invited***

Optics and Metrology for Diamond-II Upgrade
Kawal Sawhney
Diamond Light Source
The Diamond-II upgrade will provide a low emittance, high brightness source leading to not only dramatic gains in photon brightness and coherence but also additional straight sections to install up to seven new insertion device beamlines. A summary of the targeted activities of the optics and metrology group on design, metrology and innovative solutions for X-ray optics for the Diamond-II upgrade will be presented.

NOTE

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ALPS <Room 303>

ALPS-D1-03 13:30

A 50 Gb/s Widely Tunable Directly Modulated InGaAlAs/InP MQW DBR Laser

Daibing Zhou, Mengyang Zhong, Huan Li, Dan Lu, Song Liang
Institute of Semiconductors, Chinese Academy of Sciences

A widely tunable directly modulated InGaAlAs/InP MQW distributed Bragg reflector (DBR) laser has been fabricated. A wavelength tunning range greater than 10 nm and 50 Gb/s data transmission have been achieved.

ALPS-D1-04 13:45

Wavelength-Shift-Keying Communication with Forward-Biased RZ-ASK of Electro-Absorption Modulator

Yen-Hsiang Chou, Gong-Ru Lin
National Taiwan University

1-bit-delay interfered wavelength-shift-keying decoding based on forward-biased on-off-keying the EAM of an EML is demonstrated at Gbit/s bit rate with 15.9-dB extinction ratio by switching the wavelength per pulsed bit in return-to-zero data format.

----- Coffee Break 14:00-14:15 -----

[ALPS-D2] 14:15-15:15
Novel laser materials and devices
Chair: Shotaro Kitajima
Nagoya Univ.

ALPS-D2-01 14:15 ***Invited***

High-power Kerr lens mode-locked solid-state laser

Wenlong Tian, Jiangfeng Zhu
Xidian University

This report briefly introduces the current mainstream high-power Kerr lens mode-locked solid-state laser technology. It introduces recent progress in our group on high-power and high repetition-rate solid-state lasers.

ALPS <Room 511+512>

ALPS-A5-03 13:30

Fabrication of Broadband Wave-absorbing Micro/nano composite Silicon Structures by Laser Doping

Tong Chen, Weijie Liu, Ang Qiu, Qingli Wang, Wei Wang
Air Force Engineering University

A novel femtosecond laser doping method for the fabrication of Wave-absorbing micro/nano composite silicon structures was proposed. The optical properties of structures prepared by laser in environment of nitrogen, argon and sulfur hexafluoride were studied.

ALPS-A5-04 13:45

Deep Learning for Bias-switchable Organic Photodetector Applying to Hyperspectral Analysis

Wei Hsiang Lin, Hsuan Chun Chang, Chin Chuan Hsieh
VisEra Technologies Company Ltd.

Bias-switchable organic photodetectors integrated with deep learning achieve compact, scalable hyperspectral analysis, offering high accuracy and eliminating traditional multi-channel system complexities.

ALPS-A5-05 14:00

Fabrication of Transparent Nanocrytallized Glass Fiber and Microsphere Crystallized in Melt-Quenching Process

Kenji Shinozaki, Yuki Kitagawa
National Institute of Advanced Industrial Science and Technology (AIST)

Transparent glass-ceramic fibers containing fluoride nanocrystals have attracted attention as upconversion laser devices. We focused on the design of glass structures and developed a simple fabrication process without heat treatment.

ALPS <Room 413>

[ALPS-F2] 13:30-14:30
Terahertz dynamics
Chair: Yasuo Minami
Nihon Univ.

ALPS-F2-01 13:30 ***Invited***

Nanoscale Exciton Dynamics of 2D Semiconductor Studied by THz-STM

Shoji Yoshida
University ot Tsukuba

THz-STM, which combines subcycle THz pulses and STM, enables time-resolved measurements with atomic-scale spatial resolution and picosecond temporal resolution. In this study, we present nanoscale measurements of exciton dynamics on monolayer and heterobilayer of two-dimensional semiconductors using THz-STM.

ALPS-F2-02 14:00

THz Emission from a Coherent Longitudinal Optical Phonon-Plasmon Coupled Mode in an *n*-type InSb Crystal Driven without the Photo-Dember Effect

Hideo Takeuchi[1,3], Takahiro Sumioka[2]
[1]Osaka Metropolitan University, [2]Osaka City University, [3]Sophia University

We observed terahertz emission from a coherent longitudinal optical phonon-plasmon coupled (LOPC) mode in *n*-type InSb in the absence of the photo-Dember effect, suggesting that the LOPC mode is driven with stimulated Raman scattering effects.

ALPS-F2-03 14:15

Intensity Probing inside Crystals of Injection-seeded Terahertz Wave Parametric Generator

Akitoshi Niidome, Sota Mine, Kodo Kawase, Kosuke Murate
Nagoya University

Terahertz waves intensity probing inside crystal was performed by injecting probing pump beam from side of the crystal. We observed that the use of pulse seed beam changed the position of the is-TPG signal generation.

FAAP <Room 412>

FAAP3-02 13:30 ***Invited***

Optimizing Photosynthesis and Energy Efficiency with Intelligent Agricultural Lighting Automation

Wang Wenwei
Republic Polytechnic

Optimize photosynthesis and energy utilization efficiency for plants in urban agriculture, achieve significant energy savings, and increase crop yields through automatic, dynamic, and precise lighting management using IoT systems.

FAAP3-03 14:00 ***Invited***

Plant Nanobionics

Min Hao Wong
*A*STAR - Agency for Science, Technology and Reseach*

Nanotechnology is an emerging field of research within recent decades and is based upon the exploitation of nano-sized materials. In this talk, we will explore the latest advances in nanobiotechnology and its applications to the real world, particularly in plants and in agriculture.

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HEDS <Room 311+312>

[HEDS3] 13:30-15:15
LPI and parcitle source
Chair: Yuji Fukuda
QST

HEDS3-01 13:30 ***Invited***

Investigation of Ion Focusing using Structured Targets for Applications to Ion Fast Ignition

Raspberry Simpson[1], Drew Higginson[1], Tom Hodge[2], Mathieu Bailly-Grandvaux[3], Derek Mariscal[1], Elijah Kemp[1], Scott Wilks[1], Andreas Kemp[1], Jaya Sicard[1], Max Tabak[1], Ronnie Shepherd[1], William Riedel[1], Elizabeth Grace[1], Marius Millot[1], Steve MacLaren[1]
[1]Lawrence Livermore National Laboratory, [2]Orion Laser Facility, [3]University of California, San Diego

Proton fast ignition is an alternative inertial confinement fusion scheme, which relies on using laser-accelerated protons of MeV energies to heat pre-compressed inertial confinement fusion pellet in order to relax driver energy and symmetry requirements while increasing fuel gain.

HEDS3-02 13:55

Monodirectional-drive spherically convergent plasma fusion for pulsed point neutron sources

Yuki Abe[1,2], Kensei Iwasa[1], Hikaru Kato[1], Alessio Morace[2], Takumi Minami[1], Yuji Fukuda[3], Yasunobu Arikawa[2], Yoshitaka Mori[4], Eisuke Miura[5], Atsushi Sunahara[6], Hideaki Habara[1,2], Akifumi Yogo[2], Zhe Zhang[7], Shinsuke Fujioka[2], Yasuhiro Kuramitsu[1,2]
[1]Graduate School of Engineering, Osaka University, [2]Institute of Laser Engineering, Osaka University, [3]Quantum Science and Technology, Kansai Photon Science Institute, [4]The Graduate School for the Creation of New Photonics Industries, [5]National Institute of Advanced Industrial Science and Technology, [6]School of Nuclear Engineering, Purdue University, [7]Institute of Physics, Chinese Academy of Science, China

We present our recent experimental results on inertial confinement fusion (ICF) driven by mono-directional laser illumination, which is a robust way to produce bright pulsed point neutron souces for radiography and many other applications.

HEDS3-03 14:15

Simulations for laser-driven alpha particles production at PW class laser facilities

Thomas Carrière[1], Clément Caizergues[1], Diluka Singappuli[1], Howel Larreur[1,2], Marine Huault[1], Katarzyna Batani[3], Emmanuel d'Humières[1], Didier Raffestin[1], Dimitri Batani[1], Medhi Tarisien[4], Philippe Nicolai[1]
[1]CELIA - Université de Bordeaux, [2]University of Salamanca, [3]IPPLM, Warsaw, [4]Laboratoire de physique des 2 infinis de Bordeaux

New simulation methods for proton-Boron reactions driven by high-intensity laser for alpha particle production through two laser acceleration mechanisms: TNSA and Hole-Boring. Comparison of PIC only and simulation chain PIC/Monte-Carlo.

ICNNQ <Room 414+415>

[ICNNQ6] 13:45-15:00
Session 6
Chair: Takasumi Tanabe
Keio University

ICNNQ6-01 13:45 ***Invited***

Meta-optics for High-sensitivity Color Imaging

Masashi Miyata
NTT Device Technology Laboratories

This talk introduces color-dispersive metasurface optical elements and describes their great potential for enhancing the sensitivity and functionality of color imaging.

ICNNQ6-02 14:15

Rare earth Nd^{3+} doped Organic-inorganic Hybrid Perovskite Quantum Dots

Zhiping Hu, Daqian Wu, Zijun Zhan
Hangzhou Institute for Advanced Study, University of Chinese Academy of Sciences

We developed a novel B-site doping strategy for organic-inorganic hybrid perovskite QDs using rare-earth elements. Neodymium (Nd^{3+})-doped $FAPbBr_3$ QDs were synthesized through a ligand-assisted reprecipitation method at room temperature.

OMC <Room 418>

OMC3-02 13:45

Cyanobacteria cells array fabricated with optical vortex induced forward transfer

Srinivasa Rao Allam[1,3,2], Kaito Sato[1], Ken-ichi Yuyama[4], Mitsumasa Hanaoka[5], Takashige Omatsu[1,2]
[1]Graduate School of Engineering, Chiba University, 1-33 Yayoi-cho, Chiba, 263-8522, Japan, [2]Molecular Chirality Research Center, Chiba University, 1-33 Yayoi-cho, Chiba, 263-8522, Japan, [3]Institute for Advanced Academic Research, Chiba University, Chiba, 263-8522, Japan, [4]Department of Chemistry, Osaka Metropolitan University, 3-3-138 Sugimoto, Osaka, 558-8585, Japan, [5]Graduate School of Horicalture, Chiba University, 1-33 Yayoi-cho, Chiba, 263-8522, Japan

We report on the two-dimensional direct print of living cells (cyanobacteria cells) in water/polyethylene-glycol colloidal suspension) by employing the optical vortex laser induced forward transfer (OV-LIFT) technique.

OMC3-03 14:00

Directional Motion of Colloidal Structures Under Optothermal Confinement

Rahul Chand, Ashutosh Shukla, G. V. Pavan Kumar
Indian Institute of Science Education and Research (IISER) Pune

Directional motion at micro/nanoscale is crucial for biomedical and nanotechnological applications. Using optical tweezers, we demonstrate how optothermal interactions enable tunable dynamics in colloidal structures, revealing mechanisms for controlled motion with potential applications in drug delivery and microrobotics.

OMC3-04 14:15

Optical Manipulation of Helical Structures in Cholesteric Liquid Crystals with Optical Vortex

Yasunori Nawa[1], Ryuya Sonoda[1], Yasushi Tanimoto[2], Kyoko Masui[2], Chie Hosokawa[2], Keiko Tawa[1]
[1]Kwansei Gakuin University, [2]Osaka Metropolitan University

Laser beam irradiation locally controlled the helical structure in cellulosic liquid crystals. Optical vortices with L=1 maintained the pitch of the structure, while L=-1 and Gaussian reduced the pitch, suggesting structural control through topological charge manipulation.

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OWPT <Room 416+417>

[OWPT1] 13:45-15:00
Session 1
Chairs: Tomoyuki Miyamoto
Institute of Science Tokyo
Motoharu Matsuura
Univ. Electro-Communications

OWPT-OP 13:45

Opening Remarks
Tomoyuki Miyamoto[1], Kayo Ogawa[2]
[1]Institute of Science Tokyo, [2]Japan Women's Univ.

OWPT1-01 14:00 *Plenary*

Photovoltaic Receivers for Optical Wireless Power Transfer and Communication
Henning Helmers
Fraunhofer Institute for Solar Energy Systems ISE
Optical power transmission uses special photovoltaic cells, also known as photonic power converters, to convert transmitted light into electricity. In optical communication, modulated light is used to transmit data. An elegant way to combine both technologies into a single optical link that is capable of transmitting data and power is to use the photovoltaic receiver device as simulataneous receiver for both power and data.

OWPT1-02 14:30

Automatic and Adaptive Optical Wireless Power Transmission for Multiple IoT with Dual-Mode of Day and Night Charging
Mingzhi Zhao, Tomoyuki Miyamoto
Institute of Science Tokyo
This study develops an optical wireless power transmission system capable of adaptively charging multiple receivers. The system ensures precise spot size adjustment, preventing power attenuation across distances. And it maintains stable and efficient power delivery under varying lighting conditions, enabling robust, automatic operation day and night for continuous energy supply.

SI-Thru <Room 419>

SI-Thru5-02 14:00

Position estimation through scattering medium by using digital twin based on Gaussian splatting
Suguru Shimomura, Kazuki Yamanouchi, Jun Tanida
Osaka University
In this study, we propose a method for estimating positions of objects through scattering media using a digital twin. By emulating scattering process as convolution of point spread function and optimizing a digital twin consisting of Gaussian clouds with rendered images, three dimensional space behind a scattering medium can be reproduced. Experimental result shows that the position of LED behind scattering medium cab be estimated.

SI-Thru5-03 14:15

Imaging through Unknown Scattering Media Using Implicit Representations and Autocorrelation
Felipe Guzman[1], Ryoichi Horisaki[2], Esteban Vera[1]
[1]Pontificia Universidad Catolica de Valparaiso, [2]The University of Tokyo
This work combines speckle-correlation imaging and implicit neural representations for calibration-free reconstruction, achieving high-quality results with fewer artifacts than existing untrained methods.

SI-Thru5-04 14:30

High-resolution Defect Inspection under Scattering Medium with Deep Learning Ghost Imaging
Shoma Kataoka, Yasuhiro Mizutani, Tsutomu Uenohara, Yasuhiro Takaya
Osaka University
We propose Sub-pixel Deep Learning Ghost Imaging, achieving 8K resolution defect detection in a 20 mm range under scattering mediums by utilizing illumination pattern distortions to surpass optical element resolution limits.

XOPT <Room 313+314>

XOPT3-02 13:55

The Active Mirror Plane Grating Monochromator
Huang-Wen Fu, Kai-Yang Kao, Chien-Hung Chang, Chao-Yu Chang, Chih-Yu Hua, Wen-Bin Wu, Kam-Hong Wong, Hung-Wei Shiu, Pei-Yu Chuang, Cheng-Maw Cheng, Hok-Sum Fung, Chine-Te Chen
NSRRC
Active mirror plane grating monochromators(AMPGM) have been designed and installed in Taiwan Photon Source(TPS) to extend the photon energy range and achieve ultra-high resolution. The Active Mirror (AM) can be adjusted to eliminate high-order aberrations. The grazing incident angle of AM can be adjusted from 0.3 to 12 degrees to optimize the photon flux. There are six grating slots in the grating chamber.

XOPT3-03 14:10

High resolution prospects for the soft X-ray experiments at European XFEL
Natalia Gerasimova[1], Daniele La Civita[1], Justine Schlappa[1], Maurizio Vannoni[1], Andrey Sokolov[2], Harald Sinn[1], Andreas Scherz[1]
[1]European XFEL, [2]Helmholtz-Zentrum Berlin für Materialien und Energie, BESSY-II
Upgrades of the soft X-Ray monochromator at European XFEL towards higher photon energy resolution and upgrade of the hRIXS instrument towards tender X-ray range at high resolution are discussed.

XOPT3-04 14:25

Development of figure correction system based on thickness of Si for large Wolter mirror
Shutaro Mohri[1], Kento Ogasawara[1], Hiroto Motoyama[1], Satoru Egawa[1], Gota Yamaguchi[2], Guo Jianli[1], Takuya Hosobata[1], Hidekazu Mimura[1]
[1]The University of Tokyo, [2]SPring-8, RIKEN
Wolter mirrors fabricated by high-precision Ni electroforming process have been applied as focusing optics for X-ray telescopes. The typical replication accuracy is on the order of 100nm. Recently, we have been developing an efficient figure correction method based on the thickness of Si layer deposited on the inner surface of the mirror. We will introduce the developed method.

NOTE

Oral, Tuesday, 22 April PM

ALPS <Room 303> | | | FAAP <Room 412>

ALPS-D2-02 14:45

Low-Noise, Octave-Spanning Supercontinuum Generation Using a Hybrid-Geometry Si_3N_4 Waveguide

Minghe Zhao[1,2], Ruoao Yang[1], Aimin Wang[1], Qian Li[2], Zhigang Zhang[1]
[1]State Key Laboratory of Advanced Optical Communication Systems and Networks, School of Electronics, Peking University, Beijing 100871, China, [2]School of Electronic and Computer Engineering, Peking University, Shenzhen 518055, China

We demonstrated a low-noise, octave-spanning supercontinuum using a hybrid-geometry silicon nitride waveguide, achieving a threefold reduction in relative intensity noise compared to straight waveguides.

ALPS-D2-03 15:00

Thermal Modelling of Laser Activated Multi-color Phosphors for Solid State Lighting and Visible Light Communication

Aayushi Soni[1,2], Dalip Singh Mehta[1,2]
[1]SeNSE, Indian Institute of Technology Delhi, [2]Green Photonics Laboratory, Department of physics, Indian Institute of Technology Delhi

Laser-based solid-state lighting for illumination and communication using three-colored phosphors is modeled by resistance and capacitance network. The parallel model shows 14% less thermal accumulation than the series model, with parameters estimated by time-resolved photoluminescence.

----- Coffee Break 15:15-15:30 -----

FAAP3-04 14:30 ***Invited***

UAV-Based Hyperspectral Imaging for Rubber Tree Canopy Mapping: Assessing Leaf Fall Dynamics Across Clones and Tree Ages

Masita Dwi Mandini Manessa[1], Anisya Feby Efriana[1], Farida Ayu[1], Fajar Dwi Pamungkas[1], Charlos Togi Stevanus[2], Iqbal Putut Ash Shidiq[1], R. Rokhmatulloh[1], S. Supriatna[1], Retno Lestari[1], Kiwamu Kase[3], Minami Matsui[3], Tri Rapani Febbiyanti[2]
[1]Universitas Indonesia, [2]IRRI, Palembang, Indonesia, [3]Riken

This study uses UAV hyperspectral imagery and machine learning to analyze leaf fall in rubber plantations. Spectral Angle Mapper accurately classified leaf fall severity, revealing clone- and age-specific senescence patterns, aiding plantation management and productivity.

Oral, Tuesday, 22 April PM

HEDS <Room 311+312>

HEDS3-04 14:35

Ultrahigh Magnetic Field Generation by Bladed Microtube Implosion

Diya Pan, Sota Maruyama, Masakatsu Murakami
Institute of Laser Engineering, Osaka University

A blade microtube implosion driven by ultraintense lasers generates ultrahigh magnetic fields via spin currents (~peta-A/cm2). Its asymmetric structure enables sub-megatesla fields without kilotesla pre-seeding, benefiting nuclear fusion and high-field applications.

HEDS3-05 14:55

Laboratory evidence of confinement and acceleration of wide-angle flows by toroidal magnetic fields

Zhu Lei Lei[1,2], Wei Sun[3], Dawei Yuan[4], Jiayong Zhong[3], Zhe Zhang[5], Bin Qiao[2], Xiantu He[1]
[1]Institute of Applied Physics and Computational Mathematics, [2]Peking University, [3]Beijing Normal University, [4]National Astronomical Observatories, [5]Beijing National Laboratory for Condensed Matter Physics, Institute of Physics

Our experiments used laser-target interactions to study astrophysical jet collimation. We generated toroidal magnetic fields that successfully collimated wide-angle plasma flows, demonstrating both magnetic confinement and flow acceleration effects. Supported by simulations, our findings suggest toroidal fields may explain the formation of narrow astrophysical jets.

----- Coffee Break 15:15-15:30 -----

ICNNQ <Room 414+415>

ICNNQ6-03 14:30

Whispering Gallery Mode Lasing from Single Suspended $CsPbBr_3$-Quantum Dots Polymer fiber

Ze Chien Liu, Tzu Hao Chiang, Wen Cheng Tsai, Chia Kai Lin, Hsin Ming Cheng, Hsu Cheng Hsu
Department of Photonics, National Cheng Kung University, 701 Tainan, Taiwan

Suspended $CsPbBr_3$-QDs polymer fibers were prepared as WGM resonators in an ultra-low humidity environment using the drawing method. The fibers exhibited smooth surfaces and minimized optical losses due to the substrate, resulting in stable lasing.

ICNNQ6-04 14:45

Photocurrent Modulation in MoS_2 Transistors Using Laguerre-Gaussian Light

Ye-Ru Chen[1], Kristan Bryan Simbulan[2], Guan-Hao Peng[3], Yu-Chen Chang[1], Shun-Jen Cheng[3], Ting-Hua Lu[1], Yann-Wan Lan[1]
[1]Department of Physics, National Taiwan Normal University, Taipei, Taiwan, [2]Department of Mathematics and Physics, University of Santo Tomas, Manila, Philippines, [3]Department of Electrophysics, National Yang Ming Chiao Tung University, Hsinchu, Taiwan

The Laguerre-Gaussian (LG) beam, defined by azimuthal *l* and radial *p* indices, modifies light fields, introducing orbital angular momentum (OAM) and ripple-like patterns. Using a 532 nm laser and spatial light modulator (SLM), we excite a MoS_2 field-effect transistor (FET) and observe enhanced photocurrent with increasing *p* and coupled *l* and *p*. This improvement is linked to amplified photon absorption, highlighting LG beams' potential for optoelectronics.

----- Coffee Break 15:00-15:15 -----

[ICNNQ7] 15:15-16:30
Session 7
Chair: Takashi Asano
Kyoto University

ICNNQ7-01 15:15 ***Invited***

Stacked Metasurfaces using the Stickers and Photoluminescence Engineering

Shunsuke Murai, Tienyang Lo, Jiayang He, Katsuhisa Tanaka
Kyoto University

We propose a very simple strategy to obtain three-demonsional metasurface via stacking two metasurfaces. For this purpose, we use a metasurface sticker, which is the array of nanoparticles embedded in a flexible polymer. Photoluminescence moduation and induced chilarity will be demonstrated.

OMC <Room 418>

OMC3-05 14:30

Instant computational tool for laser-induced heat and fluid flows: application to a point-like heat source

Tetsuro Tsuji, Shun Saito, Satoshi Taguchi
Kyoto University

Temperature and flow fields induced by a point-like heat source, which often arises in optical trapping due to focused lasers or plasmonic heating, are obtained semi-analytically using an instant computational tool developed in Tsuji, et al. Phys. Rev. Fluids (2024).

OMC3-06 14:45

Optical manipulation of aggregation-induced emission in polymers containing tetraphenylethylene derivatives

Shun-Fa Wang[1,2], Fumitaka Ishiwari[3], Takanori Fukushima[4], Teruki Sugiyama[2,5]
[1]National Taitung University, [2]National Yang Ming Chiao Tung University, [3]Osaka University, [4]Tokyo Institute of Technology, [5]Nara Institute of Science and Technology

We present the unique phenomenon of dual fluorescence emissions of aggregation-induced emission (AIE) in a tetraphenylethylene-appended polymer manipulated by optical trapping. By utilizing transmission and fluroescence images, the dynamc changes in the trapping behavior are visuallized. We will discuss the underlying mechanism of the dual AIE fluorescence emissions from a molecular perspective in this study.

Oral, Tuesday, 22 April PM

OWPT <Room 416+417>

OWPT1-03 14:45

Suppression of water wave effects between underwater and air OWPT by lenses

Tatsuhisa Koiwa, Tomoki Yoshioka, Tomonori Miyamoto
Institute of Science Tokyo

Underwater optical wireless power transmission is expected to significantly expand the field of underwater applications. To overcome the limit of long-distance underwater light propagation caused by a still relatively large propagation loss, a system that propagates the beam between underwater and the air with low loss is attractive. The use of a lens to suppress the influence of water waves has been proposed, and its effectiveness has been confirmed by experiment.

----- Coffee Break 15:00-15:30 -----

[OWPT2] 15:30-16:45
Session 2
Chair: Shiro Uchida
Chiba Institute of Technology

OWPT2-01 15:30 ***Special***

What do we learn from Concentrator Photovoltaic (CPV) technologies for fiber power transmission: Advanced optics, optical alignment, accuracy control, packaging (encapsulation), safety, protection against unwanted operation, testing, and heat handling?

Kenji Araki
University of Miyazaki

What do we learn from Concentrator Photovoltaic (CPV) technologies for fiber power transmission: Advanced optics, optical alignment, accuracy control, packaging (encapsulation), safety, protection against unwanted operation, testing, and heat handling?

OWPT2-02 16:00

Advanced OWPT Safety System: Improved Metrics and Optimization for Multiple Intrusion Objects

Chen Zuo, Tomoyuki Miyamoto
Institute of Science Tokyo

Improvements on advanced camera-based OWPT safety system that achieves a lower overall latency of less than 40 ms, optimized for detecting and handling multiple intrusion objects, and introducing new standards and criteria of safety for OWPT.

OWPT2-03 16:15 ***Invited***

Optical Power Delivery to Implanted Medical Devices

Bahram Jalali[1], Koichiro Kishima[2]
[1]Adventure Photonics, El Segundo, [2]Pinpoint Photonics Yokohoma

Medical implants are limited by battery size and this restricts further miniaturization. Here we introduce optical power delivery as a solution. The technology enables wireless energy transfer through tissue at the visible and near-infrared biological windows for optimal penetration.

SI-Thru <Room 419>

SI-Thru5-05 14:45

Improvement of computational 3D fluorescent bead image by 3D-Unet

Shota Mizusaki, Naru Yoneda, Osamu Matoba
Kobe University

One of the problems of 3D computational imaging methods is that the image along the depth direction is blurred. In this presentation, we propose a method using 3D-Unet to improve the reconstructed 3D image along the axial direction.

----- Coffee Break 15:00-15:30 -----

[SI-Thru6] 15:30-16:30
Scattering Evaluation and Imaging
Chair: Takashi Hiroi
Shibaura Institute of Technology

SI-Thru6-01 15:30 ***Invited***

Physics-enhanced Deep Neural Networks for Computational Imaging

Guohai Situ, Fei Wang, Siteng Li, Haishan Liu
Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences

In this presentation, we present a brief review of our recent works on physics-enhanced deep neural networks (PhysenNet) for computational imaging. We show with some typical use cases that PhysenNet does not need any data to train, neither need to be trained in advance. Its output is naturally satisfied with the constrain imposed by the physical model that is incorporated with it.

SI-Thru6-02 16:00 ***Invited***

Sensing and quantifying fluorescence objects in dense scattering medium

Goro Nishimura
Hokkaido University

Sensing fluorescence objects deeply embedded in a dense scattering medium requires an optimized setup to maximize the detection limit. This talk discusses the problem, strategies, and future of sensing and quantifying fluorescence objects.

XOPT <Room 313+314>

XOPT3-05 14:40

Development of high-resolution space X-ray optics for the solar flare sounding rocket FOXSI-4: current status and future prospects

Yusuke Yoshida[1], Koki Sakuta[1], Kazuki Ampuku[1], Ryuto Fujii[1], Makoto Yoshihara[1], Keitoku Yoshihira[1], Ryoma Tanaka[1], Tetsuo Kano[1], Naoki Ishida[1], Wataru Kato[1], Yoshitaka Inoue[2], Keisuke Tamura[3,4], Takashi Okajima[3], Kikuko Miyata[5], Noriyuki Narukage[6], Gota Yamaguchi[7], Shutaro Mohri[8], Hiroto Motoyama[8], Satoru Egawa[8], Takehiro Kume[9], Yusuke Matsuzawa[9], Yoichi Imamura[9], Takahiro Saito[9], Kentaro Hiraguri[9], Hirokazu Hashizume[9], Hidekazu Mimura[7,8], Ikuyuki Mitsuishi[1]
[1]Nagoya University, [2]IMV CORPORATION, [3]NASA/GSFC, [4]University of Maryland, [5]Meijo University, [6]National Astronomical Observatory Japan, [7]RIKEN/SPring-8, [8]The University of Tokyo, [9]Natsume Optical Corporation

We have been developing high-resolution space X-ray optics by using high-precision electroforming technology. Our optics have been on board FOXSI-4, which succeeded in the world's first soft and hard X-ray imaging and spectroscopic observations of a solar flare. Currently, we have been constructing response functions in order to obtain scientific results. We will report on the current status and future prospects.

NOTE

Oral, Tuesday, 22 April PM

ALPS & HEDS & XOPT <Room 303>

[JS1] 15:30-17:00
ALPS/HEDS/XOPT Joint Session
Chairs: Hitoki Yoneda
UEC
Yuki Abe
Osaka Univ.
Makina Yabashi
RIKEN

JS1-01 15:30 ***Invited***

Gas Optics for Inertial Fusion Energy Lasers

M. R. Edwards[1], K. Ou[1], V. M. Perez-Ramirez[1], S. Cao[1], H. Rajesh[1], D. Chakraborty[1], D. Singh[1], C. Redshaw[1], P. Dedeler[1], A. Oudin[2], E. Kur[2], L. Lancia3, C. Riconda[3], and P. Michel[2]
[1]Stanford University, [2]Lawrence Livermore National Laboratory, [3]LULI, CNRS, CEA

Gas-based optics are a potential solution to the final optic problem of inertial fusion energy. We show experimental and theoretical results on the dynamics and optical properties of gas optics.

JS1-02 16:00 ***Invited***

HED Science with XFELs – Results and Future Directions

Nicholas Hartley
SLAC National Accelerator Laboratory

XFEL pulses can penetrate deep inside samples to observe phase transitions, dynamics and temperature evolution. They are therefore an important tool to develop inertial fusion energy through work at new facilities that can deliver extreme laser pulses. This talk will cover how our experiments are answering questions about fusion targets and drivers, and what new developments are still needed.

JS1-03 16:30 ***Invited***

The Upgraded APS - Status, Early Results, and Opportunities

Stefan Vogt
Argonne National Lab

We will present an update of the status of the upgrade to the Advanced Photon Source, as well as early results achieved on our beamlines. We will also present an outlook on opportunities uniquely enabled by the upgraded APS.

Oral, Tuesday, 22 April PM

ICNNQ <Room 414+415>

LSSE <Room 412>

[LSSE2] 15:30-17:00
Space Technology 1
Chair: Tadanori Fukushima
Orbital Lasers

LSSE2-01 15:30 ***Invited***

Laser-based space business - space debris removal by laser ablation and earth observation by satellite-borne laser altimeter

Masayuki Maruyama, Tadanori Fukushima
Orbital Lasers Co., Ltd.

Orbital Lasers Co., Ltd., a startup established in January 2024 through collaboration between RIKEN and SKY Perfect JSAT, develops space laser technologies focusing on space debris removal and satellite-based LiDAR Earth observation for commercial applications.

ICNNQ7-02 15:45

Solvent Engineering and Crystallization Control in Quasi-2D Halide Perovskites for Improving Photoluminescence and Lasing Characteristics

Yi Fang Ting[1], Chia Kai Lin[1], Hsin Ming Cheng[1], Hsiao Ching Chen[2], Chun Hao Li[2], Shang Da Yang[2], Hsu Cheng Hsu[1]
[1]National Cheng Kung University, [2]National Tsing Hua University

We proposed the impact of solvent selection on nucleation and crystallization kinetics, providing essential insights into synthesizing high-quality quasi-2D perovskite thin films. We achieve superior gain properties by optimizing solvent engineering, significantly reducing lasing thresholds.

ICNNQ7-03 16:00

Spectroscopic Investigations of Multiple Environments in Er:$CaWO_4$ through Charge Imbalance

Fabian Becker
Technical University of Munich

We report a spectroscopic study of the $4I_{13/2}$ and $4I_{15/2}$ Er^{3+} multiplets in Er:$CaWO_4$ without a co-dopant. Photoluminescence reveals multiple Er^{3+} environments, with full sublevel energy assignments for four. Polarization studies identify state representations and transition dipoles. Relaxation paths and similarities across environments are analyzed via spectral, lifetime, and polarization data. Becker et al., arXiv:2412.03948 (2024).

LSSE2-02 16:00 ***Invited***

Characteristics of Pulsed Laser Ablation Propulsion: Effects of Plume Divergence, Laser Wavelength and Incidence Angle

Yusuke Nakamura[1], Atsushi Isomura[1], Gakuto Sekine[1], Kei Kikuchi[1], Kentaro Miyamoto[1], Akihiro Sasoh[1], Katsuhiko Tsuno[2], Takayo Ogawa[2], Satoshi Wada[2], Tadanori Fukushima[3]
[1]Nagoya University, [2]RIKEN, [3]Orbital Lasers

Space propulsion using pulsed laser ablation is a promising technology especially for applications in debris mitigation. This paper introduces the effects of plume divergence, laser wavelength and incident angle on the characteristics of propulsion.

ICNNQ7-04 16:15

Exciton transfer and interface excitons in mixed-dimensional heterostructures

N. Fang[1], Y. R. Chang[1], S. Fujii[1,2], D. Yamashita[3], M. Maruyama[4], Y. Gao[4], C. F. Fong[1], D. Kozawa[1,5], K. Otsuka[1,6], K. Nagashio[6], S. Okada[4], Yuichiro Kato[1]
[1]RIKEN, [2]Keio Univ., [3]AIST, [4]Univ. Tsukuba, [5]NIMS, [6]U-Tokyo

We discuss exciton physics in 1D-2D heterostructures consisting of one-dimensional carbon nanotubes and two-dimensional tungsten diselenide. For small band gap nanotubes corresponding to type I band alignment, exciton transfer is observed. For large band gap nanotubes corresponding to type II band alignment, localized interface excitons exhibiting room-temperature quantum emission is observed.

LSSE2-03 16:30

Alternative Beamed Space Propulsions : Weak-laser vs XUV-light vs E-beam

Koichi Mori
Osaka Metropolitan University

Numerical and experimental results are updated for alternative techniques for the beamed-ablation space-debris removal. Three different techniques using the weak laser, the extreme ultra violet light, and the electron beam are studied.

Oral, Wednesday, 23 April AM

ALPS <Room 303>

[ALPS-D3] 9:00-10:15
Solid-state and semiconductor lasers
Chair: Yuki Tamaru
Osaka Univ.

ALPS-D3-01 9:00 *Invited*

High-efficiency GaN-based vertical-cavity surface-emitting lasers

Tetsuya Takeuchi, Satoshi Kamiyama, Motoaki Iwaya
Meijo University

We have demonstrated GaN-based blue-purple (wavelength: 420 nm) VCSELs showing a wall-plug efficiency over 20%. In this talk, we show current status and our developments of GaN-based VCSELs.

ALPS-D3-02 9:30

High-Power Ultra-Low-Noise Diamond Raman Lasers with Enhanced Linewidth Narrowing Effects

Zhenxu Bai[1,2,3], Hui Chen[1,2], Zhongan Zhao[1,2], Wenqiang Fan[1,2], Jie Ding[1,2,3], Yulei Wang[1,2,3], Zhiwei Lu[1,2,3]
[1]Center for Advanced Laser Technology, Hebei University of Technology, [2]Hebei Key Laboratory of Advanced Laser Technology and Equipment, [3]Collaborative Innovation Center for Diamond Laser Technology and Applications

A cascaded Raman conversion of a 1064 nm laser was achieved in a diamond external cavity, producing 1240 nm and 1485 nm emissions with over twofold linewidth narrowing and three orders of noise suppression, advancing high-power, narrow-linewidth laser development.

ALPS-D3-03 9:45

LED-Pumped Multi-Pass and Regenerative Nd:YAG Laser Amplifiers

Yu-Shen Yang[1], Ming-Hsiung Wu[2], Xuan-Long Ho[2], Yen-Chieh Huang[1]
[1]Natoinal Tsing Hua University, [2]LEDlas Corp.

We report LED-pumped nanosecond 4-pass and picosecond regenerative amplifiers with output peak powers of 11 and 16 MW at 1064 nm, respectively.

ALPS <Room 511+512>

[ALPS-I1] 9:15-10:15
Optical frequency combs / Frequency stabilized lasers and applications (1)
Chair: Tomohiro Tetsumoto
NICT

ALPS-I1-01 9:15 *Invited*

Ultralow-Noise Microwave Synthesis using Optical Microresonators

Qi-Fan Yang
Peking University

Utilizing a MgF_2 microresonator as optical reference and a Si_3N_4 microresonator as comb generator, we synthesize ultralow-noise 25-GHz rate microwave with -141 dBc/Hz phase noise at 10 kHz offset frequency via optical frequency division.

ALPS-I1-02 9:45

Simplified Fabrication Process for High-*Q* Aluminum Nitride Microresonators

Haochen Yan[1,2], Shuangyou Zhang[3,1], Arghadeep Pal[1,2], Alekhya Gosh[1,2], Abdullah Alabbadi[1,2], Masoud Kheyri[1,2], Tobi Bi[1,2], Yaojing Zhang[1], Pascal Del'Haye[1,2]
[1]Max-Planck Institute, Science of Light, [2]Department of Physics, Friedrich-Alexander-Universität Erlangen-Nürnberg, [3]Department of Electrical and Photonics Engineering, Technical University of Denmark

We present a new fabrication process for aluminum nitride waveguides and microresonators, which does not require a metal mask. The microresonators have intrinsic quality (Q) factors of more than 1 million and are used for frequency comb generation.

BISC <Room 419>

[BISC1] 9:00-10:15
Super-resolution Microscopy
Chair: Yasuhiro Awatsuji
Kyoto Institute of Technology

BISC1-01 9:00

Cycle-Consistent Super-Resolution Confocal Scanning Microscopy

Carlos Alejandro Trujillo[1], Lauren Thompson[3], Omar Skalli[3], Ana Doblas[2]
[1]EAFIT University, [2]University of Massachusetts Dartmouth, [3]The University of Memphis

We introduce the Cycle-Consistent Super-Resolution Confocal Scanning Microscopy (CCSRCSM) method, an unsupervised CycleGAN-based framework that translates low-resolution confocal images into super-resolved counterparts, enhancing spatial resolution and detail without requiring paired datasets or hardware modifications.

BISC1-02 9:15

Compact and Thin Snapshot Hyperspectral Light-Field Super-Resolution Imaging

Yating Chen, Liangcai Cao
Tsinghua University

This work introduces the compact Hyperspectral Light-Field Super-Resolution Imaging system (HSLSI), using a narrowband filter array for spectral information, aperture parallax for 3D spatial information, and sub-pixel shifts for SR reconstruction. A non-iterative self-supervised hyperspectral light-field SR algorithm is proposed to enhance efficiency and generalization. With one shot, HSLSI captures high-resolution 3D spatial and spectral data.

BISC1-03 9:30

An Edge Computing Super-Resolution (EdgeSR) Solution for Endoscopy

Yu-Xiang Wang[1], Yu-Hsin Chia[2,3], Min-Xuan Wang[2,4], Cheng-Hung Chu[5], Yuan Luo[1,2,5]
[1]Program for Precision Health and Intelligent Medicine, National Taiwan University, [2]Institute of Medical Device and Imaging, National Taiwan University, [3]Department of Biomedical Engineering, National Taiwan University, [4]Department of Mechanical Engineering, National Taiwan University, [5]YongLin Institute of Health, National Taiwan University

Endoscopic microscopy enables minimally invasive visualization of fine biological structures, such as neural tissues, but suffers from resolution and computational limitations in real-time imaging. We propose a lightweight deep learning-based super-resolution model optimized for NPUs, achieving 40% lower energy consumption and 10 FPS real-time optical sectioning with high-quality imaging.

BISC1-04 9:45 *Invited*

Observation and Analysis of Single-Molecule Motility in Living Cells Through Cell Physiological Events

Hideaki Yoshimura
The University of Tokyo, Japan

Information on single-molecule motility in living cells provides various clues to understanding the mechanisms of cell physiological events. Here, I introduce a technique to monitor unique molecular motility in living cells based on single-molecule imaging.

----- Coffee Break 10:15-10:30 -----

HEDS <Room 311+312>

[HEDS4] 9:00-10:55
Fusion plasma
Chair: Alexy Arefiev
UCSD

HEDS4-01 9:00 *Invited*

Ignition in the Laboratory and Understanding Implications for Fusion Energy

Daniel Casey
Lawrence Livermore National Laboratory

In this talk, we will discuss ongoing work to realize higher fusion gains at the National Ignition Facility (NIF) and understand how these results might translate to high gain fusion power systems.

HEDS4-02 9:25 *Invited*

Neutron Heating Effects on Ignition and Burn of DT Fuels in Fast Ignition Laser Fusion

Tomoyuki Johzaki
Hiroshima University

Using the axisymmetric 2D burn simulation code with the neutron and recoil ion transport codes, we carried out the ignition and burn simulations for the ignition-class to high-gain class targets. I will discuss the neutron heating effects on ignition and burn dynamics, the external heating energy required for ignition, fusion output, and neutron spectrum.

HEDS4-03 9:50 *Invited*

Synergy between the chemical-combustion experiments and astrophysical thermonuclear explosions: A case for thermonuclear supernovae

Keiichi Maeda, Kazuya Iwata
Kyoto University

Type Ia supernovae (SNe Ia) are thermonuclear explosions of a white dwarf (WD). Despite their importance in various branches of astronomy, a long debate on the triggering/propagation mode(s) of the thermonuclear flames in SNe Ia has not been resolved. We will introduce our recent activity of applying the insights from chemical-combustion experiments to this topic, and discuss how the approach could be further expanded to synergy with nuclear-fusion experiments.

Oral, Wednesday, 23 April AM

META <Room 411>

[META1] 9:00-10:30
Session 1
Chairs: Takuo Tanaka
RIKEN
Din-Ping Tsai
City University of Hong Kong

META1-01 9:00 ***Invited***

Phase change materials for tunable optics, phase singularity and surface enhanced resonance Raman scattering
Jing Hua Teng,
Kandammathe Valiyaveedu Sreekanth,
Arash Nemati, Qian Wang,
Qing Yang Steve Wu, Meng Zhao
*Institute of Materials Research and Engineering (IMRE), Agency for Science, Technology and Research (A*STAR)*

In this talk I introduce our recent works on chalcogenide phase change materials for wide-angle perfect absorption and light beam switching, steganographic coding, tunable Tamm response for SERRS and dual phase singularities with spectral tunability.

META1-02 9:30

Enabling Ultra-Compact Optoelectronic Devices by Nanophotonic Cavities
Zhaogang Dong[1,2,3]
*[1]Institute of Materials Research and Engineering, A*STAR, [2]Quantum Innovation Centre (Q.InC), A*STAR, [3]Singapore University of Technology and Design*

In this talk, we will highlight our recent work on ultra-compact light-emitting devices, with tunable emission wavelength, and chirality control, as well as miniaturized photodetectors, with ultra-wide bandwidth from visible to mid-infrared region.

META1-03 10:00

Environmental permittivity-asymmetric BIC metasurfaces with electrical reconfigurability
Haiyang Hu[1], Wenzheng Lu[1],
Alexander Antonov[1], Rodrigo Berté[1],
Stefan A Maier[2,3], Andreas Tittl[1]
[1]Chair in Hybrid Nanosystems, Nanoinstitute Munich, Faculty of Physics, Ludwig-Maximilians-Universität München, Königinstraße 10, 80539 München, Germany, [2]School of Physics and Astronomy, Monash University Clayton Campus, Melbourne, Victoria 3800, Australia., [3]The Blackett Laboratory, Department of Physics, Imperial College London, London SW7 2AZ, United Kingdom.

Achieving precise spectral and temporal light manipulation at the nanoscale remains a challenge. Here, authors develop advanced permittivity-asymmetric BIC (bound states in the continuum) metasurfaces, achieving impressive electrical switching performance with the integration of polyaniline.

OMC <Room 418>

[OMC4] 9:00-10:15
Session 2
Chair: Sile Nic Chormaic
OIST

OMC4-01 9:00 ***Invited***

Metasurface Microvehicles, Microrotors, and Micromachines Driven by Optical Forces
Mikael Käll
Chalmers University of Technology

We utilized Si metasurfaces to construct submergible and polarization-controlled quasi-2D metavehicles, metarotors, and metamachines driven by loosely focused NIR light, and we studied their collective dynamics and how they can do work on their surroundings.

OMC4-02 9:30

Optically driven orbital rotation and spin of Janus nanoparticles in a Laguerre-Gaussian vortex beam
Fengchan Zhang[1],
Alejandro Hernández-Medel[1],
Célia Tavares de Sousa[1],
Emma Martín-Rodríguez[1], Pawel Karpinski[2],
Patricia Haro-González[1]
[1]Autonomous University of Madrid, [2]Wroclaw University of Science and Technology

In this work, we utilize a circularly polarized Laguerre-Gaussian beam to drive the motion of Janus nanoparticles. The spin and orbital angular momenta of the beam induce the spinning and orbital rotation of the particles.

OMC4-03 9:45

Optical Selection of fluorescent nanodiamonds utilizing stimulated recoil force
Yoshiki Saito[1], Takao Horai[1], Yuto Makino[2,1],
Takuya Matsuda[1], Yosuke Minowa[3,4],
Hajime Ishihara[1], Masaaki Ashida[1]
[1]Graduate School of Engineering Science, Osaka University, [2]Daicel Corporation, [3]Graduate School of Science, Kyoto University, [4]The Hakubi Center for Advanced Research, Kyoto University

We demonstrate optical sorting of fluorescent nanodiamonds using resonant absorption force and stimulated recoil force. The latter method achieves 50% concentration increase in 7 hours, compared to 20% in 40 hours for the conventional approach.

Oral, Wednesday, 23 April AM

OPTM <Room 213>

[OPTM5] 9:00-10:15
Surface Inspection
Chairs: Naila Zahra
Osaka University
Jessica Onaka
Utsunomiya University

OPTM5-01 9:00 ***Invited***

Measurement Technique for Scattering Characteristics of Surface Defects of Optical Components
Weiguo Liu, Jing Yao Hou, Shun Zhou, Xueping Sun, Jin Cheng
Xian Technological University
This study, based on electromagnetic theoretical models for various defects of precision optical surface, systematically investigates the scattering behaviors and the estimation of depths of defects on optical components with varying geometries.

OPTM5-02 9:30

Surface detection based on autofluorescence signal for 3-dimensional measurement
Masaki Michihata, Kensuke Kawami, Motoya Yoshikawa, Shuzo Masui, Satoru Takahashi
The University of Tokyo
A fluorescence response based optical probing (FROP) method was proposed. Its probing characteristics was experimentally revealed, and applicability to 3D shape measurement was verified.

OPTM5-03 9:45

3D detection of surface defects on ultra-precision curved optical elements based on micro structured-light
Xi Hou[1,2,3], Mingze Li[1,2,3], Wenchuan Zhao[1,2,3], Shuai Zhang[1,2,3]
[1]National Key Laboratory of Optical Field Manipulation Science and Technology, Chinese Academy of Sciences, [2]Institute of Optics and Electronics, Chinese Academy of Sciences, [3]University of Chinese Academy of Sciences
A 3D detection method for curved surface defects using micro structured-light is developed, and the experimental results verify the effectiveness of the system in detecting defects, which can realize the 3D characterization of micro-nano defects.

OWPT <Room 416+417>

[OWPT3] 9:30-10:30
Session 3
Chairs: Kayo Ogawa
Japan Women's Univ.
Naomi Uchiyama
NIT, Sendai College

OWPT3-01 9:30 ***Invited***

Optical Wireless Power Transmission for Space Applications (Tentative)
Phillip Lubin
University of California, Santa Barbara
Optical Wireless Power Transmission for Space Applications (Tentative)

TILA-LIC <Room 315>

[TILA-LIC1] 9:00-10:30
Opening & future prospect of TILA
Chair: Xavier Mateos
University Rovira i Virgili, Spain

TILA-LIC1-01 9:00 ***Invited***

Opening remarks
Takunori Taira
RIKEN SPring-8 Center, RIKEN, Japan
By making it easy to use compact high-power lasers anytime and anywhere, we will expand into fields such as manufacturing, infrastructure maintenance, medical care, and security. We develop tiny integrated lasers (TILA) with various wavelengths and pulse widths and pursue new applications.

TILA-LIC1-02 9:30

Application of Tiny Integrated Lasers in Laser-Induced BreakdownSpectroscopy for Future Lunar Missions
Yuichiro Cho[1], Hikaru Hyuga[1], Mari Aida[2], Kasumi Yogata[2], Seiji Sugita[1], Takunori Taira[3]
[1]The University of Tokyo, [2]JAXA, [3]RIKEN SPring-8 Center
We will discuss the applications of Tiny Integrated Lasers to laser-induced breakdown spectroscopy (LIBS) measurements for future lunar missions.

TILA-LIC1-03 9:45

Effect of Flux on the Spark-Plasma-Sintering (SPS) of Translucent YVO_4:Nd^{3+} Ceramics: Microstructural Evolution, and Optical Properties
Lihong Liu, Tohru Suzuki, Koji Morita, Jiguang Li
National Institute for Materials Science
Enhanced optical properties of the (001) texture translucent YVO_4:Nd^{3+} ceramics can be achieved by adding suitable amount of $LiVO_3$ flux via designing the (001) texture using a magnetic field alignment technique followed by spark-plasma-sintering (SPS) processing.

XOPT <Room 313+314>

[XOPT4] 9:00-10:15
Imaging (I)
Chair: Manuel Guizar-Sicairos
Paul Scherrer Institut

XOPT4-01 9:00 ***Invited***

Future Coherent X-ray Imaging Capability at NSLS-II
Xiaojing Huang, Padraic Shafer, Michael Lucas, Andrew Broadbent, Yong S. Chu
National Synchrotron Light Source II
To fulfill the microscopy portfolio of NSLS-II and meet scientific needs for in situ/operando experiments, we propose two next-generation scanning nanoprobe beamlines, the Advanced Nanoscale Imaging (ANI) and the Tender X-ray Nanoprobe (TXN). They will be optimized for nanoscale imaging with faster imaging speeds over larger sample volumes, higher spatial resolution, and broader *in situ/operando* compatibilities with hard and tender X-rays, respectively.

XOPT4-02 9:30

Imaging of smallest signals - hard x-ray dichroic ptychography at the iron K edge
Maik Kahnt[1], Jeffrey Neethirajan[2], Cameron M. Kewish[3,4], Valerio Scagnoli[5,6], Claire Donnelly[2]
[1]MAX IV Laboratory, Lund University, 22100 Lund, Sweden, [2]Max Planck Institute for Chemical Physics of Solids, 01187 Dresden, Germany, [3]Australian Synchrotron, Australian Nuclear Science & Technology Organisation, Clayton VIC, 3168, Australia, [4]Department of Mathematical and Physical Sciences, School of Computing, Engineering and Mathematical Sciences, La Trobe University, Bundoora, VIC 3086, Australia, [5]Laboratory for Mesoscopic Systems, Department of Materials, ETH Zurich, 8093 Zurich, Switzerland, [6]Paul Scherrer Institute, Center for Neutron and Muon Sciences, 5232 Villigen PSI, Switzerland
While the achieved lateral resolution is always reported for X-ray mircroscopic results, the sensitivity (capability to resolve small phase shifts and optical densities) is rarely quantified. We present the most sensitve measurements to date.

XOPT4-03 9:45

Development of Tender X-ray Spectroscopic Ptychography Measurement System Using Advanced Kirkpatrick-Baez Mirrors
Yuhei Sasaki[1,2,3], Nozomu Ishiguro[1,3], Masaki Abe[1,3], Hideshi Uematsu[1,2,3], Shuntaro Takazawa[1,2,3], Naru Okawa[1,2,3], Fusae Kaneko[4,5], Yukio Takahashi[1,3,5,6]
[1]International Center for Synchrotron Radiation Innovation Smart (SRIS), [2]Department of Metallurgy, Graduate School of Engineering, Tohoku University, [3]RIKEN SPring-8 Center, [4]Sumitomo Rubber Industries, Ltd., [5]Institute of Multidisciplinary Research for Advanced Materials (IMRAM), [6]Institute for Materials Research (IMR)
We developed a ptychographic measurement system for tender X-ray spectroscopic ptychography, using advanced Kirkpatrick-Baez mirrors at NanoTerasu BL10U beamline. This system achieves high spatial resolution, sensitivity, and efficiency, significantly enhancing the potential of this technique.

NOTE

Oral, Wednesday, 23 April AM

ALPS <Room 303> | ALPS <Room 511+512> | BISC & SI-Thru <Room 419> | HEDS <Room 311+312>

ALPS-D3-04 10:00

Performance Analysis of in-band pumped Ho:YAG Ceramic Lasers with Varying Ho Doping Concentrations

Ayu Konno[1], Tetsuro Yamaoka[1], Akihito Takahashi[1], Masaki Tokurakawa[1,2]
[1]Institute for Laser Science, The University of Electro-Communications, [2]Center for Neuroscience and Bio. Eng., The University of Electro-Communications

We report on the laser performance of polycrystalline Ho^{3+}:YAG ceramics with 1.0, 3.0, 5.0 at.% Ho^{3+} ion-doping levels.

ALPS-I1-03 10:00

Dispersion Engineered, Mode-Interaction-Free High-Q Crystalline Microresonators for Soliton Frequency Comb Generation

Ryomei Takabayashi[1], Liu Yang[1,2], Hikaru Kodama[3], Yasuhiro Kakinuma[3], Takasumi Tanabe[1], Shun Fujii[2]
[1]Department of Electronics and Electrical Engineering, Faculty of Science and Technology, Keio University, [2]Department of Physics, Faculty of Science and Technology, Keio University, [3]Department of System Design Engineering, Faculty of Science and Technology, Keio University

We demonstrate a single soliton frequency comb in a dispersion-engineered crystalline microresonator. Ultraprecision machining and subsequent polishing enable ultrahigh-Q factors while maintaining the machine-shaped structure that results in the suppression of mode interactions.

----- Coffee Break 10:15-10:30 -----

----- Coffee Break 10:15-10:30 -----

HEDS4-04 10:15

Pico second time resolution neutron detector for burning plasma measurement on inertial confinement fusion

Yasunobu Arikawa
Institute of Laser Engineering, Osaka University

To observe the fusion burn wave in experiments, an advanced resolution detector to measure fusion-generated neutrons and gamma rays with picosecond time resolution are required. We have developed an ultra-fast detector having time resolution of 2.5 ps sensitive to neutron, g-ray, electron, and ions at Institute of Laser Science, Osaka University, using the Gekko XII and LFEX laser system.

HEDS4-05 10:35

Progress and key challenges of hotspot pressure campaign in DT-layered implosion experiments at the Shenguang Laser Facility

Li-Feng Wang
Institute of Applied Physics and Computational Mathematics

In the past three years, the hotspot pressure campaign in DT-layered implosion experiments at the SG-100 kJ Laser Facility in China has made milestone progress and the hotspot pressure has exceeded 40 Gbar. The implosion performance can be improved by reducing the Atwood number at the fuel-ablator interface and the fuel compression can be improved by optimizing matching of the pre-pulse and the main pulse and the rise-time optimization of the main pulse.

----- Coffee Break 10:55-11:10 -----

[ALPSp1] 10:30-12:00
ALPS Poster Session 1
<Exhibition Hall A>

Poster session program p.134-

[JS2] 10:30-12:30
BISC/SI-Thru Joint Session

Chair: Osamu Matoba
Kobe University

JS2-01 10:30 ***Invited***

High-resolution *in vivo* Light Field Fluorescence Microscopy

Zhifeng Zhao
Tsinghua University

The rapid advancement of computational power has revolutionized microscopic imaging, breaking through the limitations of traditional optical imaging in life science observations. Leveraging the concept of computational imaging, we have developed a scanning light-field microscopy technique and proposed the principle of digital adaptive optics, enabling long-term, high-resolution, three-dimensional *in vivo* imaging.

JS2-02 11:00 ***Invited***

Lensless Image Reconstruction via Different Learning Models

Chung-Hao Tien, Jia-Lun Wu
National Yang Ming Chiao Tung University

This study examines the tradeoff associated with non-generative and generative learning models in lensless image reconstruction, providing mathematical insight and the interpretability for the unconventional optics.

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ICNNQ <Room 414+415>

[ICNNQp] 10:30-12:00
ICNNQ Poster Session
<Exhibition Hall A>

Poster session program p.136-

LSSE <Room 412>

[LSSE3] 10:00-12:00
Renewable Energy 1
Chair: Katsushi Fujii
RIKEN

LSSE3-01 10:00 ***Invited***

High-Efficiency Solar-to-CO Conversion Enabled by Molecular Mn Complex Catalysts in a CO_2 Flow Electrolyzer Using Silicon Photovoltaics

Keita Sekizawa, Shunsuke Sato, Naonari Sakamoto, Tomiko M. Suzuki, Takeshi Morikawa
Toyota Central R&D Labs., Inc.

Electrochemical CO_2 conversion using Earth-abundant manganese complex and FeOOH catalysts achieves 94% CO selectivity at 1.35 V. Coupling with silicon-based photovoltaics outperforms systems with multi-junction III-V photovoltaics and noble-metal catalysts.

LSSE3-02 10:30 ***Invited***

Oxygen evolution on electrolytic oxidation electrode of zirconium compounds with nitrogen species in alkaline media

Koichi Matsuzawa, Sho Nishino, Akimitsu Ishihara
Yokohama National University

For the expansion of renewable energies, the electrode demonstrated the electrolytic oxidation of ALD-ZrN with interlayer has high catalytic activity for the oxygen evolution reaction which is used for rechargeable battery and water electrolysis.

LSSE3-03 11:00 ***Invited***

Nanocurvature-Induced Field Effects Enable Control Over the Activity of Single-Atom Electrocatalysts

Yanwei Lum
National University of Singapore

Here we discover that uniformly tunable electric field modulation can be achieved using a model system of single-atom catalysts (SACs). These consist of M-N_4 active sites hosted on a series of spherical carbon supports with varying degrees of nanocurvature.

META <Room 411>

META1-04 10:15

Bound states in the continuum in silicon nitride gratings for biomarker detection

Leonid Beliaev[1], Osamu Takayama[1], Sanshui Xiao[1,2]
[1]DTU Electro –Department of Electrical and Photonics Engineering, Technical University of Denmark, [2]NanoPhoton – Center for Nanophotonics, Technical University of Denmark

We present a silicon nitride grating supporting quasi-bound states in the continuum for biosensing myoglobin, a myocardial infarction biomarker. With a detection limit of 49 ng/mL, the platform shows promise for clinical lab-on-chip applications.

----- Coffee Break 10:30-11:00 -----

[META2] 11:00-12:00
Session 2
Chairs: Jing Hua Teng
*IMRE, A*STAR*
Takuo Tanaka
RIKEN
Din-Ping Tsai
City University of Hong Kong

META2-01 11:00

Friedrich-Wintgen Bound States in the Continuum in an all Al Terahertz Device

Zizwe Chase[1], Tenyu Aikawa[1], Gustavo Rodriguez-Barrios[2], Andrey Baydin[2], Zairui Li[3], Wesley Sims[3], Pai-Yen Chen[1], Thomas Searles[1], Junichiro Kono[2]
[1]University of Illinois Chicago, [2]Rice University, [3]Morehouse College

We achieve ultra strong coupling in an all Al cavity-emitter system that shows FW-BIC. Exploring this phenomenon in the terahertz region is crucial, as it provides a greater communications bandwidth compared to microwave frequencies.

OMC <Room 418>

OMC4-04 10:00

Conservation law for angular momentum of electromagnetic field derivatives: Analysis of optical spin and orbital loss

Shun Hashiyada, Yoshito Y. Tanaka
Hokkaido University

We propose a framework for separately analyzing losses of optical angular momentum (AM), spin AM (SAM), and orbital AM (OAM) in light-matter interactions. Conventional methods rely on vector potentials of charge and current densities for matter systems, whose unclear physical meaning limits loss evaluation. Our field-derivative approach resolves this, enabling SAM and OAM loss analysis, including optical spin-orbit conversion, in matter systems.

----- Coffee Break 10:15-10:45 -----

[OMC5] 10:45-12:00
Session 3
Chair: Malte Gather
University of St. Andrews

OMC5-01 10:45 ***Invited***

Vector Vortex Beam Generator Produced by Polarization Holography

Xiaodi Tan[1,2,3], Shujun Zheng[1], Junchao Jin[1], Jingyu Wang[1], Xianmiao Xu[1], Shenghui Ke[1], Xinyi Yuan[1], Junhui Wu[1], Zaijing Chen[1], Li Wang[1], Hong Cheng[1], Zhengyu Li[1], Xueyan Chen[1], Xu Zheng[1], Yi Yang[1,2], Yuhong Ren[1,3]
[1]Information Photonics Research Center, College of Photonic & Electronic Engineering, Fujian Normal University, [2]Key Laboratory of Opto-Electronic Science and Technology for Medicine of Ministry of Education, Fujian Normal University, [3]Fujian Provincial Key Laboratory of Photonics Technology, Fujian Normal University

This paper aims to provide readers with new insights and broaden the applications of vector vortex beam generator produced by polarization holography and polarization sensitized material in more scientific and technological research fields.

Oral, Wednesday, 23 April AM

OPTM <Room 213>

OPTM5-04 10:00

Non-Destructive Spectral Reflectance Measurements of Antireflection Coating on Optical Lenses with Small Radius of Curvature

Boonsong Sutapun, Lawan Sampanporn
Suranaree University of Technology

In this work, we propose a nondestructive measurement technique for measuring the spectral reflectance of antireflective coatings on spherical and aspheric lenses using a modified fiber-optic chromatic confocal microscope.

----- Coffee Break 10:15-10:30 -----

[OPTM6] 10:30-12:15
Quality Inspection
Chair: Masaki Michihata
The Univesity of Tokyo

OPTM6-01 10:30 ***Invited***

Confocal Spectropolarimetric Microscope Based on Channeled Spectropolarimetry

Kazuhiko Oka, Hikaru Kimura, Takumu Abe, Xiaoshuai Chen
Hirosaki University

A hyperspectral polarimetric microscope is described in this presentation. A confocal microscope is combined with channeled spectropolarimetry so that the microscopic images of Stokes parameters can be obtained in the spectral range of 500-700nm.

OPTM6-02 11:00 ***Invited***

Optical Critical Dimension Metrology of HAR Micro and Sub-Micro Structures Using AI-Driven Optical Scatterometry for Advanced Semiconductor Packaging

Ling-Chia Chen
National Taiwan University

This article introduces an AI-driven optical scatterometry method with global sensitivity analysis (GSA) for OCD metrology in semiconductor structures. It addresses challenges in measuring sub-micron HAR features by integrating GSA with DUV and SWIR scatterometry, achieving <3% errors compared to AFM and SEM, and proving reliable for HAR metrology.

OWPT <Room 416+417>

OWPT3-02 10:00

Design of Metasurface-based Beam Homogenizer for Optical Wireless Power Transmission

Natsuha Ochiai[1,2], Yohei Toriumi[1], Madoka Takahashi[1], Satoshi Iwamoto[2]
[1]NTT Space Environment and Energy Laboratories, [2]Research Center for Advanced Technology, The University of Tokyo

We propose a compact and lightweight beam homogenizer using a metasurface for efficient optical wireless power transmission. The designed metasurface transform an input Gaussian beam into a flat-top beam, achieving a 45% improvement in power transmission efficiency when used with a 6×6 photovoltaic (PV) array compared to that without the homogenizer.

OWPT3-03 10:15

Cell Connection Optimization and Time Series Forecast to Improve Laser Energy Transmission Efficiency

Kazuto Kashiwakura, Yohei Toriumi, Natsuha Ochiai, Madoka Takahashi
NTT Space Environment and Energy Laboratories

We investigated the use of an optimization algorithm and time series forecast for the photovoltaic cell junction. We found that high efficiency can be expected during long-term operation under atmospheric turbulence.

----- Coffee Break 10:30-11:00 -----

[OWPT4] 11:00-12:00
Session 4
Chair: Kensuke Ikeda
CRIEPI

OWPT4-01 11:00 ***Invited***

Power Regulation based on Optical Dialogue Configuration for Power Electronic System

Dingyi Lin, Fujin Deng
Southeast University

This paper proposes a power regulation for power electronic systems based on optical dialogue configuration. The regulation dynamically adjusts optical power according to the PPC's output voltage to operate near its maximum power point (MPP), minimizing power loss and heat generation.

TILA-LIC <Room 315>

TILA-LIC1-04 10:00

Magneto-optically Q-switched microchip laser using magnetic garnet films

Taichi Goto
Tohoku University

Magneto-optical Q-switched lasers use magnetic field-controlled garnet films with maze domains. We demonstrated operation using a 100-μm-thick garnet film and achieved epitaxial growth directly on laser crystals by sputtering.

TILA-LIC1-05 10:15

Highly sensitive observation of surface-activated amorphous layers by time-resolved coherent Raman spectroscopy

Ryu Yoshizawa[1,2], Keisuke Seto[1], Tsuneto Kanai[1], Atsunori Sakurai[1,2,3], Toshiki Sugimoto[1,2,3]
[1]Insititute for Molecular Science, [2]SOKENDAI, [3]RIKEN HARIMA

Using time-resolved coherent Raman spectroscopy, an approximately 10 nm thick amorphous layer on the surface-activated quartz was observed at both the topmost-surface and buried interface configurations. High-sensitivity detection revealed medium-range structures characteristic of the surface-activated amorphous layers.

----- Coffee Break 10:30-11:00 -----

[TILA-LIC2] 11:00-12:00
TILA-LIC 2025 PLENARY I
Chair: Takunori Taira
RIKEN SPring-8 Center, Japan

TILA-LIC2-01 11:00 ***Invited***

Ultrabroadband nonlinear nanophotonics in thin-film lithium niobate (TFLN)

Martin M. Fejer
Stanford Univ.

Strong nonlinear coupling and dispersion engineering available with the tight optical confinement in nanophotonic TFLN waveguides enable efficient nonlinear optics with few-cycle/multi-octave pulses. Novel routes to coherent continua in travelling-wave and resonator interactions are discussed.

XOPT <Room 313+314>

XOPT4-04 10:00

High-Resolution Imaging with Multibeam Ptychography: A Pathway to Unlocking Insights into Complex Samples

Tang Li[1], Maik Kahnt[2], Thomas L. Sheppard[3], Runqing Yang[4], Ken Vidar Falch[1], Roman Zvagelsky[5], Pablo Villanueva-Perez[4], Martin Wegener[5], Natalia Lenshina[6], Mikhail Lyubomirskiy[2]
[1]Deutsches Elektronen-Synchrotron DESY, [2]MAX IV Laboratory, Lund University, [3]Karlsruhe Institute of Technology, Institute for Chemical Technology and Polymer Chemistry, [4]Division of Synchrotron Radiation Research and NanoLund, Department of Physics, Lund University, [5]Karlsruher Institut für Technologie, Institut für Angewandte Physik, [6]McKinsey and Company, London

Multibeam ptychography (MBP) significantly advances hard X-ray imaging by utilizing multiple coherent beams to enhance data acquisition efficiency and address traditional limitations. This innovation enables faster, high-resolution 3D imaging of complex materials and biological systems, such as catalysts and embryos, even at higher X-ray energies, expanding the scope of modern X-ray microscopy.

----- Coffee Break 10:15-10:35 -----

[XOPT5] 10:35-12:05
Imaging (II) / Method
Chair: Hiroto Motoyama
The University of Tokyo

XOPT5-01 10:35 ***Invited***

Spatial X-ray Modulator

Kenji Tamasaku[1], Takahiro Sato[2], Taito Osaka[1], Diling Zhu[2], Tetsuya Ishikawa[1]
[1]RIKEN SPring-8 Center, [2]SLAC National Accelerator Laboratory

This work presents the first spatial X-ray modulator, which can dynamically control the X-ray beam profile with the help of a femtosecond optical laser, and its applications in active optics and single pixel imaging.

XOPT5-02 11:05

Advances in X-ray Spectral and Phase Contrast Imaging: A Unified Approach for a Multi-Modal Imaging System

Ralf Hendrik Menk[1,2,3], Luca Brombal[2,4], Paola Perion[2,4], Luca Sbuelz[2,4,5], Francesco Brun[2,6], Sandro Donato[7,8], Fulvia Arfelli[2,1,4]
[1]Elettra Sincrotrone Trieste, [2]Istituto Nazionale di Fisica Nucleare, Division of Trieste, Trieste, Italy,, [3]Department of Computer and Electrical Engineering, Mid Sweden University, Sundsvall, Sweden, [4]Department of Physics, University of Trieste, Trieste, Italy, [5]IOM, CNR, Trieste, Italy 6Department of Engineering and Architecture, University, [6]Department of Engineering and Architecture, University of Trieste, Trieste, Italy, [7]Department of Physics, University of Calabria, Rende (CS), Italy., [8]Istituto Nazionale di Fisica Nucleare, Division of Frascati, Frascati (RM), Italy

The integration of X-ray spectral and phase contrast imaging enables detailed analysis and visualization of complex samples. This combined approach offers unique capabilities for simultaneous structural and elemental characterization, enhancing the quantitative analysis of materials. Here we provide an overview of such system's principles, advantages, and potential applications and will present preliminary results.

NOTE

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ALPS <Room 303>

[ALPSp1]

Poster session program p.134-

----- Lunch 12:00-13:00 -----

ALPS <Room 511+512>

----- Lunch 12:00-13:15 -----

BISC & SI-Thru <Room 419>

JS2-03 11:30 ***Invited***

Scattering and reflection-encoded mid-infrared photothermal microscopy and its biomedical applications

Ryo Kato[1,2,3,4]
[1]*Osaka University,* [2]*PRESTO, JST,* [3]*RIKEN,* [4]*Tokushima University*

In this talk, I will introduce our recent work on chemical imaging of biological samples using scattering and reflection light-encoded mid-infrared photothermal (MIP) microscopy, which is a super-resolution all optical infrared imaging technique. By taking full advantages of MIP microscopy, we visualized the distribution of chemical compositions in biological tissues and single-cells at sub-micron scale.

JS2-04 12:00

Vector Wavefront Imaging using Transport-of-Intensity Equation with a Polarization Camera

Yuki Yamamoto, Suguru Shimomura, Yusuke Ogura
Osaka University

We present a vector wavefront imaging method based on the transport-of-intensity equation combined with a polarization camera. Experimental results demonstrate its capability in reconstructing a spatial distribution of complex amplitudes and polarization states simultaneously.

JS2-05 12:15

Quantitative Polarization Imaging by Digital Holography

Manoj Kumar[1,2], Osamu Matoba[2]
[1]*Amity University Punjab, India,* [2]*Kobe University, Japan*

A new method of polarization-angular multiplexing digital holographic microscopy is experimentally demonstrated for quantitative phase anisotropy imaging of the biological cells and polarized optical components.

----- Lunch 12:30-14:00 -----

HEDS <Room 311+312>

[HEDS5] 11:10-12:15
High pressure material 1
Chair: Gianluca Gregori
University of Oxford

HEDS5-01 11:10 ***Invited***

Deployment of X-ray Photon Correlation Spectroscopy in High-Energy Density Science Experiments

Charles Heaton[1], Yin Hao[2,3], Dimitri Khaghani[4], Hae Ja Lee[4], Hannah Poole[5], Eric Blackman[3,5,6], Nina Boiadjieva[4], Celine Crépisson[1], Gilbert Collins[2,3,5,6], Adrien Descamps[7], Arianna Gleason[4], Christian Gutt[12], Alexander Petsch[4], Lisa Randolph[9], Silke Nelson[4], Peregrine McGehee[4], Rajan Plumley[4,8,10], Christopher Spindloe[11], Thomas Stevens[1], Charlotte Stuart[1], Joshua Turner[4,8], Jessica Shang[2,3,6], Hussein Aluie[2,3,6], Gianluca Gregori[1]
[1]*Department of Physics, University of Oxford,* [2]*Department of Mechanical Engineering, University of Rochester,* [3]*Center for Matter at Atomic Pressures, University of Rochester,* [4]*SLAC National Accelerator Laboratory,* [5]*Department of Physics and Astronomy, University of Rochester,* [6]*Laboratory of Laser Energetics, University of Rochester,* [7]*School of Mathematics and Physics, Queens University Belfast,* [8]*Stanford Institute for Materials and Energy Sciences,* [9]*European XFEL,* [10]*Department of Physics, Carnegie Mellon University,* [11]*Central Laser Facility (CLF), STFC Rutherford Appleton Laboratory,* [12]*Department of Physics, The University of Siegen*

Report on a recent experiment at MEC in which the feasibility of X-ray photon correlation spectroscopy in high energy density science has been demonstrated.

HEDS5-02 11:35

High Power Nanosecond Laser for Dynamic Shock Compression and roadmap to kJ-class laser at high repetition rate

Olivier Zabiolle, Stephane Branly, Florian Mollica, Franck Falcoz, Anna Golinelli, Pierrick Leroy, Pierre-Mary Paul
Amplitude Laser

Key words: Pulse shaped nanosecond laser, Dynamic Shock Compression, High Average Power, High Peak Power, kJ-class laser. We report here the latest achievements in the development of high energy high repetition rate nanosecond lasers along with our road map aimed at ramping up the energy to kJ level with a very high repetition rate (one shot every 60 seconds!) which is requested by the users.

HEDS5-03 11:55

Shock Compression of Pre-Compressed Water: Toward the 300 K Isotherm with a Novel Diamond Anvil Cell

Diluka Singappuli[1], Noaz Nissim[2], Eran Greenberg[2], Donaldi Mancelli[3], Lior Perelmutter[2], Meir Werdiger[2], Keisuke Shigemori[4], Norimasa Ozaki[4], Katarzyna Batani[5], Gilad Oren[2], Nir Sapir[2], Shalom Eliezer[2], Dimitri Batani[1]
[1]*CELIA - University of Bordeaux,* [2]*Applied Physics Department - Soreq NRC,* [3]*IPPL - Hellenic Mediterranean University,* [4]*ILE - Osaka University,* [5]*IPPLM*

We present shock compression data for water at pre-compression pressures up to 4 GPa, leveraging a novel diamond anvil cell design. Simulations reveal plasma dynamics critical for achieving higher pre-compression pressures, advancing access to the H_2O cold curve.

----- Lunch 12:15-13:45 -----

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ICNNQ <Room 414+415>

[ICNNQp]

Poster session program p.136-

----- Lunch 12:00-13:00 -----

LSSE <Room 412>

LSSE3-04 11:30 *Invited*

TBD

Chi David Cheng
UNSW

TBD

----- Lunch 12:00-13:00 -----

META <Room 411>

META2-02 11:15

Integrated-Resonant Meta-Devices: from broadband to narrowband

Rong Lin, Jin Yao, Din Ping Tsai
City University of Hong Kong

We take broadband achromatic focusing and narrowband wavelength-selective focusing as examples to explore the superiority of integrated-resonant meta-devices across both broadband and narrowband optical regimes.

META2-03 11:30

Twist Metamaterials with Adjustable Chiroptical Properties Using Nanoantenna Sticker

Jiayang He, Shunsuke Murai, TienYang Lo, Katsuhisa Tanaka
Kyoto University

We propose a concise and handy way of preparing twisted metamaterials. Our method utilizes the nanoantenna sticker and measure the circular dichroism.

META2-04 11:45

Polarization metalens enables tunable 1D directional edge enhancement

Wenli Wang
Beijing Institute of Technology

Here, we develop a tunable 1D directional edge enhancement system using a polarization metalens. Results show this system has a different function for edge extraction of the amplitude and phase targets.

----- Lunch 12:00-13:30 -----

OMC <Room 418>

OMC5-02 11:15

Evaluating the spatial resolution of Stokes camera II

Monia Akter, Shoki Nagai, Yoko Miyamoto
The University of Electro-Communications

We previously evaluated the spatial resolution of the Stokes camera (Photonic Lattice WPI 200) using cross-sectional and Fourier analyses of polarization fringes. We present an improved Fourier analysis using a Hann window filter and tuning the filter width.

OMC5-03 11:30

Zero-bias photocurrent through the edge channels in quantum Hall devices by optical vortex illumination

Kenichi Oto[1,2], Hajime Hasegawa[1], Takato Hirano[1], Yuki Okawara[1], Takashige Omatsu[2,3]
[1]Department of Physics, Chiba University, [2]Molecular Chirality Research Center, Chiba University, [3]Graduate School of Engineering, Chiba University

We have studied the photocurrent induced by an optical vortex irradiation on the two-dimensional electron system in the quantum Hall conditions. The edge channels along the sample boundary carry the photocurrent to the electrodes without the backscattering, the dependence on photocurrent by the topological charge of the irradiating optical vortex can be detected using quantum Hall devices with macroscopic size.

OMC5-04 11:45

Spin angular momentum of femtosecond space-time surface plasmon polariton wave packet

Atsushi Kubo[1], Kotaro Kihara[1], Kei Motoi[1], Naoki Ichiji[2]
[1]University of Tsukuba, [2]The University of Tokyo

We numerically evaluate the SAM texture of femtosecond ST-SPPs excited on a silver surface. These ultrashort ST-SPPs exhibit a highly localized three-dimensional electric field distribution, remain unaffected by group velocity dispersion spreading inherent to the SPP dispersion relation, and propagate at arbitrary group velocities. The spatial pattern of the SAM texture and the orientation of the spin vectors show a strong dependence on the group velocity.

----- Lunch 12:00-13:00 -----

Oral, Wednesday, 23 April AM

OPTM <Room 213>

OPTM6-03 11:30

Industrial solution for 12" wafer high speed quality inspection - FSS 310

Markus Kogel-Hollacher, Stefan Weiss, Simon Mieth, Oliver Schulz
Precitec Optronik GmbH

The FlyingSpotScanner (FSS) provides OCT measurements for thickness and topography based on a breakthrough, unique technology that enables high-speed, non-contact inspection for quality assurance across a wide range of materials and surfaces, especially a 12 inches diameter wafer can be fully checked for TTV, bow and warp in just seconds.

OPTM6-04 11:45

Research on image quality optimization and point cloud processing algorithms for micro-bump height measurement

Haoxuan Zhu[1], Bin Liu[1], Jiantao Lan[2], Xin Liu[2], Chaoqian Zhang[2], Tianling Ren[3], Guanhao Wu[1]
[1]BNRist, Dept. of Precision Instrument, Tsinghua University, [2]Beijing C&W Electronics (Group) Co., Ltd., Beijing Electronics Holding Co., Ltd, [3]BNRist, School of Integrated Circuit, Tsinghua University

Accurate micro-bump height measurement is crucial in advanced semiconductor packaging. A light intensity adjustment technique is proposed that automatically regulates the light source, optimizing existing micro-bump measurement methods that rely on feature extraction from images. Additionally, a point cloud semantic segmentation method is introduced for automatic and rapid measurement.

OPTM6-05 12:00

Addressing Optical Path Maintenance Need in Infrared Small Target Detection Applications

Birce Gulec Boyaci Mutlu, Tolga Aksoy
ASELSAN

Robust detection of small infrared (IR) targets relies on image quality, affected by defocusing and outdated calibration. A two-stage method identifies maintenance needs, improving detection rates and reducing false alarms through optical path adjustments.

----- Lunch 12:15-13:00 -----

OWPT <Room 416+417>

OWPT4-02 11:30

Analog Radio and Power over Fiber Monitored via Bragg Gratings in Multicore Fiber Links

Javier Barco[1], Ruben Altuna[1], David Sánchez[1], David Barrera[2], Salvador Sales[2], Carmen Vázquez[1]
[1]Universidad Carlos III de Madrid, [2]Universidad Politécnica de Valencia

We present a Power over Fiber (PoF) monitoring technique using Tilted Fiber Bragg Gratings in multicore fiber links with Analog Radio over Fiber transmission. Tests on 4- and 7-core fibers demonstrated resolutions below 1 dB while transmitting 5G NR signals and delivering 700 mW PoF at remote nodes.

OWPT4-03 11:45

Experimental Demonstration of Power-Over-Fiber Transmissionfor Driving Fire Detectors in Expressway Tunnels

Hayato Seto[1], Yu Miyakawa[1], Yuki Okumura[2], Masaki Hiro[2], Kouji Matsuoka[2], Wataru Takahashi[2], Motoharu Matsuura[1]
[1]The University of Electro-Communications, [2]Nippon Expressway Research Institute Company Limited

Fire detectors in expressway tunnels play an important role in quickly and accurately detecting fires and minimize the dam-age of tunnel fire. In this study, we experimentally demonstrate the verification of fire detectors driven by power-over-fiber in order to construct a more reliable power supply system for fire detectors. We successfully confirm the accurate operation of the fire detector located far away by supplying power using a 2 km multimode optical fiber.

----- Lunch 12:00-13:30 -----

XOPT <Room 313+314>

XOPT5-03 11:20

An Advanced Analysis Method for Multiple Image Radiography(MIR)

Farangis Foroughi[1,2], Nicholas Simonson [1], Omar Marinos[1], David Krapohl[2], Börje Norlin[2], Ralf Hendrik Menk[2,3], Dean Chapman[1]
[1]University of Saskatchewan, [2]Mid Sweden University, [3]Elettra Sincrotrone Trieste

Multiple-Image Radiography (MIR) enhances imaging contrast by exploiting phase-based interactions and microstructure scattering phenomena. A new simplified analysis method resolves drift and normalization challenges and enables low-dose imaging of living tissue microstructures, validating biomedical applications.

XOPT5-04 11:35

Towards Near Real-time Computation of Autocorrelation Functions for X-ray Photon Correlation Spectroscopy using FPGAs

Artem Saleev[1], Lisa Randolph[1], Sebastian Frücht[1], Hans-Georg Steinrück[1,2], Tobias Kenter[3,4], Abdul Rehman Tareen[3], Rene Lammert[3], Christian Plessl[4,3], Michael Sprung[5], Fabian Westermeier[5], Philipp Middendorf[6]
[1]Institute for a Sustainable Hydrogen Economy (INW), Forschungszentrum Jülich, [2]Institute of Physical Chemistry, RWTH Aachen University, [3]Paderborn Center for Parallel Computing (PC2), [4]Department of Computer Science, Paderborn University, [5]Deutsches Elektronen-Synchrotron DESY, [6]Center for Free-Electron Laser Science CFEL

Many XPCS experiments are producing a large stream of raw and unprocessed data. This data avalanche leads to a significant mismatch between data reduction/processing and measurement time. For computation of the autocorrelation functions (ACFs) from a stream of detector images, we are making use of field programmable gate arrays (FPGAs) for near real-time data analysis.

XOPT5-05 11:50

Development and validation of modeling software SURFwiX to guide high-precision processing of materials of industrial relevance

Vladimir Lipp[1,2,3], Ichiro Inoue[4], Satoru Egawa[5], Gota Yamaguchi[4], Dariia Breus[6], Heshmat Noei[7], Sven Toleikis[7], Beata Ziaja[3,2]
[1]European XFEL, [2]Institute of Nuclear Physics, Polish Academy of Sciences, [3]Center for Free-Electron Laser Science CFEL, Deutsches Elektronen-Synchrotron DESY, [4]RIKEN SPring-8 Center, [5]Research Center for Advanced Science and Technology, The University of Tokyo, [6]Taras Shevchenko National University of Kyiv, [7]Deutsches Elektronen-Synchrotron DESY

We present a computational tool SURFwiX, able to predict the response of silicon surface to a tightly focused XUV pulse and thus guide its nanomachining in industrial applications. The experimental study performed at SACLA verified the validity of the SURFwiX predictions and confirmed the possibility of controlled and reproducible XUV-pulse surface processing at the predicted pulse parameters.

----- Lunch 12:05-13:30 -----

----- Lunch 12:00-13:30 -----

NOTE

Oral, Wednesday, 23 April PM

ALPS <Room 303>

[ALPS-D4] 13:00-14:15
High-power fiber lasers
Chair: Shotaro Kitajima
Nagoya Univ.

ALPS-D4-01 13:00 ***Invited***

All-fiber beam shaping technologies for advanced material processing

Yongmin Jung[1], Natasha Vukovic[1], Christophe A. Codemard[2], Michalis N. Zervas[1,2]
[1]University of Southampton, [2]Trumpf Laser Uk Ltd

We present a novel all-fiber approach for generating multi-spot and quasi-Bessel beams using multimode interference, providing a compact, efficient solution for high-power laser systems in material processing, including precision drilling and cutting applications.

ALPS-D4-02 13:30 ***Invited***

Multi-kW Transmission Through Hollow-Core Fibers

Rodrigo Amezcua Correa, Timothy Bate, Matthew A. Cooper, Timothy Bate, Jose E. Antonio-Lopez
CREOL, USA

Recent developments in hollow-core fiber design have enabled high energy transmission not possible in solid core fibers. We review a single-mode narrow-linewidth transmission capable of transmitting with low loss over long distances in an AR-HCF.

ALPS-D4-03 14:00

Toward Spatial Mode Selection by Active Mode Locking

Yusuke Katsumata, Akira Shirakawa
The University of Electro-Communications

We attempted spatial mode selection using active mode-locking in a fiber ring resonator. By varying the frequency applied to the intracavity acoustic optical modulator, transition between Q-switched mode-locking and cw mode-locking was observed.

----- Coffee Break 14:15-14:30 -----

ALPS <Room 511+512>

[ALPS-I2] 13:15-14:15
Optical frequency combs / Frequency stabilized lasers and applications (2)
Chair: Chiaki Ooae
UEC

ALPS-I2-01 13:15 ***Invited***

Single-Cavity Dual-Comb Fiber Laser

Shu-Wei Huang
University of Colorado Boulder

We present a single-cavity dual-comb fiber laser with all-optical dynamic repetition rate modulation, enabling ultrafast pump-probe measurements. This approach overcomes the trade-off between speed and time resolution, achieving high-sensitivity, low-complexity ultrafast spectroscopy.

ALPS-I2-02 13:45

Dual-comb spectroscopy using quantum correlated optical combs

Zhuoren Wan, Ming Yan, Heping Zeng
East China Normal University

We exploit quantum correlations in twin combs to suppress shot noise in a frequency up-converted mid-infrared dual-comb spectroscopy platform, achieving 2.3 dB noise squeezing and high-resolution (7.5 pm) molecular spectra in the 3 μm region.

ALPS-I2-03 14:00

OAM-dependent Pump-probe Measurement with Ultrawide Temporal Dynamic Range using Dual Optical Frequency Combs

Akifumi Asahara[1,2], Kaoru Minoshima[1]
[1]The Univ. of Electro-Communications, [2]JST, PRESTO

We demonstrate OAM-dependent pump-probe measurement based on dual-comb configuration, where ultrawide dynamic range is achieved utilizing the asynchronous optical sampling technique.

----- Coffee Break 14:15-14:30 -----

BISC <Room 419>

[BISC2] 14:00-16:00
Computational Imaging
Chair: Yuan Luo
National Taiwan University

BISC2-01 14:00

Feature-domain phase retrieval for high-fidelity computational microscopy

Shuhe Zhang, Liangcai Cao
Department of Precision Instruments, Tsinghua University

We propose Feature-Domain Phase Retrieval (FD-PR), a framework applicable to various computational microscopy. Instead of working directly with images' pixel values, FD-PR uses image features to guide the reconstruction of optical wavefronts and thus takes advantage of invariance components of images against mismatches of physical models.

BISC2-02 14:15

Optical Phase Detection System for Human Lung Cancer Cells using AI assisted Isotropic Differential Phase Contrast Microscopy

Yuan-Chung Cheng[1], Hao-Pin Chiu[2], Cheng Yu[4], Jing-En Lin[5], Clara Lavita Angelina[6], Sunil Vyas[1], Yuan Luo[1,2,3]
[1]Institute of Medical Device and Imaging, National Taiwan University, [2]Department of Biomedical Engineering, National Taiwan University, [3]Program for Precision Health and Intelligent Medicine, National Taiwan University, [4]College of Medicine, National Taiwan University, [5]Department of Physics, National Taiwan University, [6]Graduate School of Engineering Science and Technology, National Yunlin University of Science and Technology, Yunlin

Isotropic Differential Phase Contrast (iDPC) microscopy is a non-invasive quantitative imaging technique for visualizing and recovering phase images using multi-axis image pairs. We propose a deep learning model based on YOLO for quantitative phase detection of human lung cancer cells, achieving over 85% in Precision, Recall, and F1 score. This label-free approach shows potential for cell analysis and supporting cancer research and diagnostics.

HEDS <Room 311+312>

[HEDS6] 13:45-15:00
Warm dense matter 1
Chair: Hiroshi Sawada
University of Nevada, Reno

HEDS6-01 13:45 ***Invited***

Experimental inference and improved modeling of electron scattering mechanisms affecting conductivity

Alina Kononov[1], Brian Robinson[1,2], Thomas Hentschel[3], Minh Nguyen[1], Amanda Dumi[1], Lucas Stanek[1], Andre Schleife[2], Andrew Baczewski[1], Stephanie Hansen[1]
[1]Sandia National Laboratories, [2]University of Illinois at Urbana-Champaign, [3]Cornell University

We investigate opportunities to infer electrical conductivity from x-ray scattering data and improve the treatment of electron scattering mechanisms in conductivity models using density functional theory, Bayesian statistics, and the GW approximation.

HEDS6-02 14:10 ***Invited***

Ion Temperature Measurements and Equilibration in Warm Dense Matter using High Resolution Inelastic X-Ray Scattering at X-ray Free Electron Lasers

Bob Nagler
SLAC National Accelerator Laboratory

We will present recent results on the measurement of ion temperature, ion-electron equilibration, and the determination of the Debye temperature in WDM using a newly developed technique that leverages high-resolution inelastic X-ray scattering at X-ray free-electron lasers.

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ICNNQ <Room 414+415>

[ICNNQ8] 13:00-14:45
Session 8
Chair: Wakana Kubo
Tokyo University of Agriculture and Technology

ICNNQ8-01 13:00 *Invited*

Manipulation of photons based on photonic crystal nanocavities
Takashi Asano, Susumu Noda
Kyoto University

Dynamic control of coupled photonic high-Q nanocavity systems is of interest for advanced photonic applications such as photonic buffer memories, time-reversal of photons, and on-chip non-reciprocity. In this symposium, we will report on (I) on-demand photon transfer between high-Q nanocavities based on dynamic and electrical control, (II) our efforts to design coupled high-Q nanocavities, and (III) theoretical studies on non-reciprocal photonic devices.

ICNNQ8-02 13:30 *Invited*

Quantum Dot-Based Quantum Light Sources for Telecom Applications: Challenges and Opportunities
Elizaveta Semenova
Technical University of Denmark

Quantum information technology has made significant strides in recent years. However, the development of scalable and efficient quantum light sources — crucial for enabling future quantum networks and remote computing systems — remains an open challenge.

ICNNQ8-03 14:00

Dynamic modulation of excitons in monolayer WSe_2 under surface acoustic waves
Yuta Takahashi, Takumi Yamamoto, Kazuki Maezawa, Hajime Kumazaki, Shinichi Watanabe, Shun Fujii
Keio University

We demonstrate dynamic modulation of the excitonic photoluminescence properties in monolayer WSe_2 under propagating surface acoustic waves. These findings pave the way for precise manipulation and control of excitonic luminescence in semiconducting 2D materials.

ICNNQ8-04 14:15

Bi-Wavelength-Lasing DFBLD for Wavelength-Decoyed Data Communication
Hsiao-Hui Chen[1], Gong-Ru Lin[1], You-Xin Wang[1], Yu-Sheng Liao[2], Yu-Chieh Chi[2]
[1]National Taiwan University, [2]Sanway Optoelectronic Tech. Corp., New Taipei City 235601, Taiwan R.O.C.

C-band phased quantum keying with a bi-wavelength-lasing DFBLD is demonstrated for wavelength-selectable and wavelength-decoyed cryptographical communication.

LSC <Room 421>

[LSC1] 13:25-14:45
HHG and XFEL (1)
Chair: Hiroki Wadati
University of Hyogo

LSC-OP 13:25

Opening Remarks
Shunsuke Nozawa
High Energy Accelerator Research Organization

LSC1-01 13:30 *Invited*

XAFS Measurements of Gaseous Media using a Laser-Based Light Source in the Water Window Region
Nobuhisa Ishii, Momoko Maruyama, Ryuji Itakura
National Institutes for Quantum Science and Technology

We developed a high-power light source around 2000nm in an OPCPA pumped by an Yb:YAG laser. The light source has been applied to HHG up to 620 eV and XAFS measurements of gaseous media.

LSC1-02 13:50 *Invited*

X-ray terahertz nonlinear optics in solids
Noriaki Kida[1,2]
[1]Japan Synchrotron Radiation Research Institute, [2]RIKEN SPring-8 Center

Here, we talk about the observation of terahertz waves emitted from a solid by X-ray excitation, which has never been reported so far. By studying the relationship between X-ray polarization and crystal orientation, we show that X-ray excitation produces second-order nonlinear polarization, resulting in the emission of terahertz waves. The X-ray-induced terahertz-radiation characteristics are discussed in details.

LSC1-03 14:10 *Invited*

Correlation dynamics between lattice and charge order in electronic ferroelectric materials observed by time-resolved X-ray diffraction
Ryo Fukaya[1,2], Tatsuo Fujii[3], Naoshi Ikeda[4], Hironori Nakao[2], Shunsuke Nozawa[2], Shin-ichi Adachi[2], Yoichi Okimoto[5]
[1]Institute for Solid State Physics, University of Tokyo, [2]Institute of Materials Structure Science, High Energy Accelerator Research Organization, [3]Department of Applied Chemistry, Okayama University, [4]Department of Physics, Okayama University, [5]Department of Chemistry, Institute of Science Tokyo

We investigated non-equilibrium dynamics correlated with ultrafast change of polar structure in electronic ferroelectric RFe_2O_4 thin film by time-resolved X-ray diffraction utilizing synchrotron radiation. The dynamics of electron-electron interactions, elastic wave propagation, and charge disordering on a sub-nanosecond timescale will be presented.

LSSE <Room 412>

[LSSE4] 13:00-15:00
Renewable Energy 2
Chair: Takeharu Murakami
RIKEN

LSSE4-01 13:00 *Invited*

Ni Single Atom Catalysts for Large-scale, Selective CO_2 Electrolysis
Jihun Oh
KAIST

The electrochemical reduction of carbon dioxide (CO_2RR) is a promising pathway for converting CO_2 into valuable products, particularly carbon monoxide (CO). In this talk, I will present the synthesis of Ni single atom catalysts (Ni SACs) at a 100 g/batch scale and discusses their CO_2RR properties in both neutral and acidic environments in a membrane-electrode-assembly (MEA).

LSSE4-02 13:30 *Invited*

Durable Solar Water Splitting: Single-Atom Alloy Catalyst on Passivated $BiVO_4$ Photoanode
Maheswari Arunachalam, Soon Hyung Kang
Chonnum National University

Hydrogen production via solar water splitting requires high-performance photoelectrodes. Using a $BiVO_4$ photoanode with an HfO_2 passivation layer and single-atom Ni-Pt, we achieve ~6.5 mA cm^{-2} at 1.23 V_{RHE} and 800 h stability.

LSSE4-03 14:00 *Invited*

Sonochemical System Allowing Direct Air Capture (DAC) and Conversion of Alcohols to Hydrogen
Tomonori Kawano[1,2], T. Hasegawa[1], K. Yanagawa[1], K. Fujii[2], S. Wada[2]
[1]The University of Kitakyushu, [2]RIKEN Center for Advanced Photonics

Here, we report an attempt to perform capturing of carbon dioxide directly from the ambient air under sonochemical system originally designed for conversion of water/alcohol mixture to hydrogen.

META <Room 411>

[META3] 13:30-14:45
Session 3
Chairs: Zhaogang Dong
Singapore University of Technology and Design
Takuo Tanaka
RIKEN
Din-Ping Tsai
City University of Hong Kong

META3-01 13:30 *Invited*

Room-Temperature, Tunable Lasing from Quasi-2D Perovskites Integrated with Plasmonic Lattices
Yu-Jung Lu
Academia Sinica

We presented a stable, wavelength-tunable, room-temperature single-mode laser based on quasi-2D perovskites coupled with a waveguide-hybridized surface lattice resonance mode composed of aluminum nanoparticle arrays.

META3-02 14:00

Enhancing photonic spin Hall effect at surface plasmon resonance
Cherrie May Olaya[1], Norihiko Hayazawa[1], Maria Herminia Balgos[1], Takuo Tanaka[1,2]
[1]RIKEN, [2]Tokushima University

We demonstrate the enhancement of photonic spin Hall effect at surface plasmon resonance of gold film. The additional spin degree of freedom provided in the measurement presents an innovative approach towards spin-controlled nanophotonic devices.

META3-03 14:15

Application of Quantum Meta-device
Yubin FAN, Shufan F. Chen, Din-Ping Tsai
City University of Hong Kong

We realized a miniaturized, high-dimensional quantum random number generator. The device has a compact footprint as small as 1 mm2 while achieving high-dimensional randomness with up to 100 dimensions.

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OMC <Room 418>

[OMC6] 13:00-14:30
Session 4
Chair: Pietro Giuseppe Gucciardi
CNR Istituto Processi Chimico-Fisici

OMC6-01 13:00 ***Invited***

Spatiotemporal Hologram: from Concept to Experimental Realization and Applications
Qiwen Zhan
University of Shanghai for Science and Technology
Spatiotemporal hologram technique enableing precise joint control of amplitude and phase of light fields in both space and time is demonstrated. Its applications in generating various spatiotemporally structured light fields are presented.

OMC6-02 13:30

Nonlinear Airy Beam Propagation in defected photonic waveguide arrays
Clara Ethuin, Nacera Bouldja, Delphine Wolfersberger
LMOPS/Chaire Photonique, CentraleSupélec, Université de Lorraine
This study explores the numerical interaction of nonlinear Airy beams with a photorefractive crystal and a photonic lattice. The introduction of defect guides into the photonic lattice enables novel methods to control beam propagation.

OMC6-03 13:45

Analytical study of electric field spin skyrmions in the evanescent field of a plasmonic nanogap antenna
Christophe Pin[1], Keiji Sasaki[2]
[1]Okinawa Institute of Science and Technology, [2]Research Institute for Electronic Science, Hokkaido University
Skyrmions and other topological particle-like textures have recently been predicted and observed in structured electromagnetic waves and surface plasmon polaritons. However, those topological textures cannot be focused beyond the diffraction limit. We demonstrate here that nanoscale skyrmion textures can be created in the spin angular momentum density of the evanescent electric field of plasmonic multimer nanostructures.

OMC6-04 14:00

Second harmonic generation of optical skyrmions
Sushanta Kumar Pal[1], A Srinivas Rao[1], Hiroko Yokota[2], Takashige Omatsu[1]
[1]Chiba University, [2]Institute of Science Tokyo
We demonstrate experimentally the second harmonic generation of a picosecond 1.06 μm optical skyrmion using a nonlinear crystal β-BaB_2O_4. Interestingly, the second harmonics exhibits super-resolution properties (focused spot diameter is approximately three times smaller than that of the fundamental optical skyrmion. We believe that this demonstration will be useful for applications such as super-resolution microscopy and optical lithography.

OPTM <Room 213>

[OPTM7] 13:00-14:15
Computational Imaging and Spectroscopy
Chair: Yasuhiro Mizutani
Osaka University

OPTM7-01 13:00 ***Invited***

Towards miniaturization of single-pixel imaging systems - Preliminary experimental demonstrations with fibers-
Kanami Ikeda
Osaka Metropolitan University
This study presents foundational experimental demonstrations aimed at the miniaturization of single-pixel imaging systems. The approach employs multi-core fibers and fiber arrays as pattern generators. These preliminary findings establish a basis for the development of highly compact imaging systems leveraging advanced optical fiber technologies.

OPTM7-02 13:30

Data acquisition method for dynamic resolution imaging of compressive sensing-based single-pixel camera
Hung Duy Nguyen, An Thanh Nguyen, Hien Thu Nguyen, Linh Mai, Quang Duc Pham
University of Engineering and Technology, Vietnam National University Hanoi
In this research, we propose a new method that does not use a fixed resolution for a single-pixel camera and it enables the camera to record images of the object in various resolutions based on the amounts of obtained measurements.

OPTM7-03 13:45

Performance verification test for the underwater laser Doppler velocimeter in deep-sea area
Shojiro Ishibashi[1], Takamitsu Okada[2], Keisaku Takada[2]
[1]Japan Agency for Marine-Earth Science and Technology (JAMSTEC), [2]Mitsubishi Electric Defense and Space Technologies Corp. (MEDS)
The underwater laser Doppler velocimeter that is currently under development and a result of the performance verification test conducted to evaluate its basic performance using a underwater vehicle are shown.

OPTM7-04 14:00

On-Line Hydrogen Quality Control for Fuel Stations Using Raman spectroscopy
Christian Richard Günther[1], Benedikt Haske[1], Lavinia Appold[1,2], Alexander Stratmann[2], Andreas Ostendorf[1], Cemal Esen[1]
[1]Ruhr University Bochum, Department of Mechanical Engineering, Applied Laser Technologies, Universitätsstr. 150, 44801 Bochum, Germany;, [2]Robert Bosch GmbH, Postfach 30 02 20, 70442 Stuttgart, Germany
A transportable diode-based Raman spectrometer was used to proof the concept of effectively performing on-line hydrogen quality analysis at fuel stations. Spectra of hydrogen and possible constituents were collected and quantified using linear multivariate regression.

OWPT <Room 416+417>

[OWPT5] 13:30-15:15
Session 5
Chair: Noriyuki Yokouchi
Furukawa Electric

OWPT5-01 13:30 ***Plenary***

Optical Wireless Power Delivery: Opportunities, Challenges and Progress
Stephen J. Sweeney
University of Glasgow
Optical wireless power transmission (OWPT) offers potential across many applications, leveraging developments in laser and photovoltaic technologies. We review the technological challenges in developing systems with differing demands and requirements on power, efficiency and operating safety.

OWPT5-02 14:00 ***Invited***

Hollow Core Fibers for High-Power Signal and Energy Transmissions
Kazunori Mukasa, Takeshi Takagi, Keita Takahata
Furukawa Electric Co. Ltd.
Hollow core fiber is an innovative optical fiber with the potential to break the limits of conventional optical fibers. Examples of innovation are ultra-low nonlinearity, ultra-low loss, and low latency. The ultra-low non-linearity would open many new applications and one exciting application is high-power signal and energy transmission.

SI-Thru <Room 419>

[SI-Thrup] 13:30-15:00
SI-Thru Poster Session
<Exhibition Hall A>

Poster session program p.137

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TILA-LIC <Room 315>	XOPT <Room 313+314>		

[TILA-LICp] 13:30-15:00
Poster Session & ATLA Project - 2
<Exhibition Hall A>

Poster session program p.138

[XOPTp] 13:30-15:00
XOPT Poster Session
<Exhibition Hall A>

Poster session program p.138-

Oral, Wednesday, 23 April PM

ALPS <Room 303>

[ALPS-D5] 14:30-16:00
Optical frequency comb and narrow linewidth lasers
Chair: Akira Shirakawa
UEC

ALPS-D5-01 14:30 ***Invited***

Phase modulation and demodulation for high power single frequency lasers
Yan Feng
Hangzhou Institute for Advanced Study, University of Chinese Academy of Sciences
Phase modulation and demodulation approach is explored for the generation of high power single frequency lasers at visible or ultraviolet regime. Phase demodulation based on nonlinear optics is introduced for power scaling.

ALPS-D5-02 15:00 ***Invited***

Dual-Comb Spectroscopy for Quantification of Greenhouse Gas Emissions in Agriculture
Ian R Coddington[1], Griffin Mead[4], Daniel Herman[1], Kevin Cossel[1], Nathan Malarich[2,3], Eduardo Santos[5], Brian Washburn[1]
[1]NIST CTL, [2]NOAA CSL, [3]Sandia National Laboratory, [4]CDPHE, [5]Kansas State University
Dual-comb spectroscopy offers a powerful way to quantify agricultural emissions on a local and regional scale. We showcase its ability quantify methane and to measure cattle emissions in pastures and feedlots as well as the ability validate and refine regional inventories.

ALPS <Room 511+512>

[ALPS-I3] 14:30-15:45
Optical frequency combs / Frequency stabilized lasers and applications (3)
Chair: Shun Fujii
Keio University

ALPS-I3-01 14:30 ***Invited***

Hz-level Broadband Spectrometer for High-Order Dispersion Soliton
Shuangyou Zhang[1,2]
[1]Technical University of Denmark, [2]Max Planck Institute for the Science of Light
Microresonator group velocity dispersion plays a critical role in soliton dynamics. We demonstrate real-time Hz-level broadband spectroscopy using a dual radio-frequency modulated laser to precisely characterize microresonator dispersion, including up to fifth-order dispersion.

ALPS-I3-02 15:00

Exploring injection conditions of an electro-optic comb into a microresonator frequency comb
Tomohiro Tetsumoto, Kentaro Furusawa, Norihiko Sekine
National Institute of Information and Communications Technology
We investigated conditions for optical injection locking of microcombs using electro-optic combs. This study will contribute to advancing millimeter-wave and terahertz-wave generation and synchronization techniques for applications such as next-generation wireless communication.

BISC <Room 419>

BISC2-03 14:30

Dynamic event measurement using transport-of-intensity phase imaging under commercially available confocal microscopy
Naru Yoneda[1,2], Tappei Matsuoka[3], Joe Sakamoto[4,5], Takumi Tomoi[6], Yosuke Tamada[7,8,9], Tomomi Nemoto[4,5,10], Osamu Matoba[1,2]
[1]Graduate School of System Informatics, Department of System Science, Kobe University, [2]Center of Optical Scattering Image Science, Kobe University, [3]Faculty of Engineering, Kobe University, [4]Biophotonics Research Group, Exploratory Research Center on Life and Living Systems, [5]Division of Biophotonics, National Institute for Physiological Science, [6]Faculty of Science and Technology, Department of Applied Biological Science, Tokyo University of Science, [7]Faculty of Engineering, Utsunomiya University, [8]Center for Optical Research and Education (CORE), Utsunomiya University, [9]Robotics, Engineering and Agriculture-TechnologyLaboratory (REAL), Utsunomiya University, [10]The Graduate University for Advanced Studies (SOKENDAI)
Quantitative phase imaging (QPI) based on transport of intensity equation (TIE) under commercially available confocal microscopy have been proposed. The proposed method uses bright field module attached in usual confocal microscopy. In this paper phase distributions of living cells are measured by using TIE-based confocal microscopy. The experimental results indicate the proposed method can measure phase distributions of dynamic events.

BISC2-04 14:45

Accurate phase recovery using a computational approach to transport of intensity equation
Shubham Tiwari, Dalip Singh Mehta
Indian Institute of Technology, Delhi, 110016, India
We propose a phase recovery method using transport of intensity equation(TIE) where instead of using a solution to TIE we use TIE based constraint to computationally recover phase. The method is expected to be more robust and accurate compared to the traditional FFT-based solution to TIE.

BISC2-05 15:00

Investigating the imaging performance of a compressive sensing-based single-pixel camera under the effect of object movement
An Thanh Nguyen, Hien Thu Nguyen, Hung Duy Nguyen, Thao Ngoc Pham, Quang Duc Pham
University of Engineering and Technology, Vietnam National University Hanoi
We investigated the effects of object movement on the imaging characteristics produced by a single-pixel camera.

HEDS <Room 311+312>

HEDS6-03 14:35 ***Invited***

Plasma screening inferred from line shifts and ultrafast melting of Warm Dense Copper
Michal Šmíd
Helmholtz-Zentrum Dresden-Rossendorf
Plasma screening was experimentally measured by observing energy shifts in bound-bound transitions in solid density, T ~ 100 eV plasma. Ultra-fast melting was studied via the time evolution of ion and electron temperatures from x-ray absorption. These studies provide data for refining plasma screening models and related effects, enhancing our understanding of atomic physics in Warm Dense Matter.

----- Coffee Break 15:00-15:20 -----

Oral, Wednesday, 23 April PM

ICNNQ <Room 414+415>

ICNNQ8-05 14:30

Lasing from the Quantum Well of InGaAs Nanowire Arrays on Silicon-on-Insulator Substrates

Balthazar Gaspar Temu, Zhao Yan, Bogdan-Petrin Ratiu, Sang Soon Oh, Qiang Li
Cardiff University

Lasing from core-shell nanowires with a radial quantum well as the active material is demonstrated for undeformed, stretched and compressed honeycomb lattices. Simulation and experimental results confirm lasing is from the radial quantum well.

[ICNNQ-CL] 14:45-14:55
Closing Remarks
Chair: Toshiharu Saiki
Keio University

LSC <Room 421>

LSC1-04 14:30

X-ray Absorption Near Edge Structure (XANES) Imagingto Visualize Chemical Species in Biological Samples

Ryohei Sasaba[1,2], Hiroshi Iwayama[2]
[1]The University of Osaka, [2]Institute for Molecular Science

We developed XANES imaging equipment using a contact type X-ray microscope technique for visualizing chemical species in biological samples.

----- Coffee Break 14:45-15:00 -----

[LSC2] 15:00-15:55
HHG and XFEL (2)
Chair: Noriaki Kida
JASRI

LSC2-01 15:00 *Invited*

Structural Dynamics of Photo-functional Metal Complexes Studied by Time-resolved XAFS

Shunsuke Nozawa[1,2], Ryo Fukaya[3,1], Shin-ichi Adachi[1,2]
[1]Institute of Materials Structure Science, High Energy Accelerator Research Organization, [2]Materials Structure Science Program, SOKENDAI, [3]Institute for Solid State Physics, The University of Tokyo

In this study, metal complex molecules in solution were excited by a high repetition rate laser pulse of 400 kHz, and their photo modulation components were measured. As a result, we succeeded in visualizing transient electronic state changes from spectral changes in the XANES region and molecular structures of excited states at the atomic level from vibrational modulations in the EXAFS region.

LSSE <Room 412>

LSSE4-04 14:30 *Invited*

Charge-Transfer-Induced Geometric Distortion in Nickel Bicarbonate/ Carbon Nanotube Composites for Improved Oxygen Evolution and Reduction Reaction

Min Hyung Lee
Kyung Hee University

Carbon-based $Ni(HCO_3)_2$@CNT catalysts enable enhanced OER and ORR efficiencies through charge-transfer-induced distortion of Ni active sites. This bifunctional catalyst outperforms noble metals, offering a cost-effective solution for energy conversion and renewable energy applications.

META <Room 411>

META3-04 14:30

Multi-channel Quantum Meta-Hologram for Display

Shufan Chen[1], Yubin Fan[1], Hong Liang[3], Yuhan Wang[2], Fangxing Lai[2], Mu Ku Chen[1], Jensen Li[3], Shumin Xiao[2], Din Ping Tsai[1]
[1]City University of Hong Kong, [2]Harbin Institute of Technology, [3]Hong Kong University of Science and technology

VR displays, which initially found success in gaming and interactive scenes, still face challenges like bulkiness, dual-channel display issues, and noise reduction. In our study, we demonstrate a quantum meta-hologram using Titanium dioxide (TiO2), which improves imaging contrast from 0.36 dB to 6.8 dB and effectively reduces noise. This ultracompact meta-hologram removes speckles and multiple reflective light noise by quantum techniques.

----- Coffee Break 14:45-15:15 -----

[META4] 15:15-16:00
Session 4
Chairs: Yu-Jung Lu
Academia Sinica
Takuo Tanaka
RIKEN
Din-Ping Tsai
City University of Hong Kong

META4-01 15:15

Metalens array for high-dimensional quantum random number generator

Yubin Fan, Shufan Chen, Xiaoyuan Liu, Xiaoyu Che, Xiaodong Qiu, Mu-Ku Chen, Din-Ping Tsai
City University of Hong Kong

We experimentally realized a miniaturized, high-dimensional quantum random number generator on a meta-device without post-randomness extraction, achieving high-dimensional randomness with up to 100 dimensions.

Oral, Wednesday, 23 April PM

OMC <Room 418>

OMC6-05 14:15

A Mobile Electric Field Sensor Device Based on Optically Levitated Nano-Resonators

Yuehao Wang[1,2], Yunjie Shi[1], Zhenhai Fu[1]
[1]Zhejiang Lab, [2]Zhejiang University

Optically levitated nano-resonators show promise in electric field sensing, but integration challenges persist. We developed a compact device (1200×549×524 mm) with a miniaturized optical probe (60×70×200 mm) using microcrystalline glass. Simulations minimized external field effects, achieving 800μV/cm/Hz$^{1/2}$ sensitivity and optimal performance at 129.6 kHz. This device advances practical low-frequency levitated optomechanics.

OPTM <Room 213>

----- Coffee Break 14:15-14:30 -----

[OPTM8] 14:30-16:00
Applied Optics and Laser Processing
Chairs: Ryoichi Kuwano
Hiroshima Institute of Technology
Yoshio Hayasaki
Utsunomiya University

OPTM8-01 14:30 ***Invited***

Occlusion supporting augmented reality near-eye display

Jae-Hyeung Park, Woongseob Han, Myeong-Ho Choi, Chanseul Lee
Seoul National University

Occlusion of real objects by digital virtual images is a key feature that enhances the outdoor image visibility and three-dimensional depth perception of the augmented reality near-eye displays. In this paper, we introduce our recent work that enables the occlusion support for the optical-see-through near-eye displays.

OPTM8-02 15:00

Dependence of laser-generated ultrasound on pulse energy, pulse repetition, and material structures in laser drilling

Kaede Yamauchi, Shunto Watanabe, Sotaro Komatsu, Yoshio Hayasaki
Utsunomiya University

Ultrasound is generated when a femtosecond laser pulse is focused on a material surface. Ultrasound provides helpful information in material laser processing. The ultrasound was measured by a microphone and an optical interferometer.

OPTM8-03 15:15

The influence of focus position on photonic nanojet formation for sub- micrometer scale pulsed laser ablation in water medium

Reza Aulia Rahman[1,2], Tsutomu Uenohara[1], Yasuhiro Mizutani[1], Yasuhiro Takaya[1]
[1]The University of Osaka, [2]University of Muhammadiyah Malang

By controlling the laser focusing position, photonic nanojets enable precise sub-micrometer silicon machining underwater, achieving extended propagation and a long depth of focus for enhanced surface patterning precision.

OPTM8-04 15:30

Integrated laser self-mixing prototype for optical power and beam size measurement

Yuanfu Tan
The Chinese University of Hong Kong

This study introduces an integrated prototype that employs laser self-mixing technology to measure both laser power and beam size. By integrating these functionalities into a single device, the setup is simplified, cost is reduced, and the ease of use is enhanced.

OWPT <Room 416+417>

OWPT5-03 14:30 ***Invited***

The Importance of High Power Optical Cable in Industrial CW Laser

Daniel Lee
Optizone Technology (Shenzhen) Limited

What role should the high power optical cable play in industrial CW lasers? Perhaps some people in the industry think that such cables are insignificant to the industry. On the contrary, the importance of high power optical cable in fiber laser can't be ignored. In actual fact, a high power optical cable can sometimes determine the life span of a fiber laser.

OWPT5-04 15:00

Overview of Broadcom's optical power converter product roadmap

Simon Fafard, Denis Masson
Broadcom

The presentation will update Broadcom's offering of multijunction PV laser power converter covering Regular-Power (<1 W), Medium-Power (< 3 W), long-wavelength for long distance PoF, cryogenic operations, and High-Power devices for power-beaming in the 1050 nm - 1080 nm spectral range

SI-Thru <Room 419>

[SI-Thrup]

Poster session program p.137

Oral, Wednesday, 23 April PM

TILA-LIC <Room 315>

[TILA-LICp]

Poster session program p.138

[TILA-LIC3] 15:00-16:00
Social implementation of TILA
Chairs: Hiroyuki Takigami
RIKEN SPring-8 Center, Japan
Yoichi Sato
RIKEN SPring-8 Center, Japan

TILA-LIC3-01 15:00 ***Invited***

Transition Dynamics of Pulsed Operation in Near-Infrared Waveguide Lasers
Fabian Rotermund
KAIST, Korea
We present the transition dynamics of pulsed laser operation, covering the progression from Q-switching and Q-switched mode-locking (QSML) to continuous-wave mode-locking (CWML) in Yb-doped channel waveguide lasers operating in the near-infrared wavelength range. In the purely CWML regime, we could achieve stable sub-picosecond pulses.

TILA-LIC3-02 15:30

Service life extension of infrastructure by laser peening using a high-power tiny integrated laser (TILA)
Yuji Sano[1], Y Mizuta[1], S Tamaki[1], T Hosokai[1], T Taira[2], T Kato[3], Y Sakino[3]
[1]Osaka University, [2]NINS, [3]Kindai
Fatigue tests on HT780 specimens simulating tensile dead load showed that in-situ laser peening with a TILA significantly extended fatigue life. This opens up the possibility of using laser peening to extend the service life of infrastructure.

TILA-LIC3-03 15:45

Social implementation of the tiny integrated lasers (TILA) and peripheral technologies
TILA Consortium
Institute for Molecular Science
Commercial products related to Micro Solid-State Photonics and Tiny Integrated Lasers will be introduced by several companies associated with TILA-consortium.

XOPT <Room 313+314>

[XOPTp]

Poster session program p.138-

Oral, Wednesday, 23 April PM

ALPS <Room 303>

ALPS-D5-03 15:30

Simulation of Narrow Linewidth 980 nm Distributed Feedback and Distributed Bragg Reflector Lasers with Surface Gratings

Ada Lona Dumitrescu
KTH Royal Institute of Technology

980nm Distributed Feedback and Distributed Bragg Reflector single-mode lasers with surface gratings are designed. The use of surface gratings avoids problematic overgrowth and enables a narrow beam divergence and a narrow linewidth emission.

ALPS-D5-04 15:45

Development of a Blue Laser Diode Power Build up Cavity in Excess of 100W Intracavity Power for Raman Trace Gas Analysis

Yuji Ichikawa[1], Ippei Asahi[1], Tatsuo Shiina[2], Shigeru Yamaguchi[3]
[1]Shikoku Research Institute, [2]Chiba University, [3]Tokai University

A power build up cavity (PBC) utilizing a blue laser diode was developed for Raman spectroscopic analysis of gas mixtures. A 100 W intra-cavity beam can be generated to detect trace hydrogen leak detection.

ALPS <Room 511+512>

ALPS-I3-03 15:15

Fiber-Connected 300 GHz Si_3N_4 Microresonator as Soliton Comb Source

Miezel Legurpa Talara[1], Kodai Yamaji[2], Yoshihiro Makimoto[1], Kenji Nishimoto[2], Yu Tokizane[1], Naoya Kuse[1], Takeshi Yasui[1]
[1]Institute of Post-LED Photonics (pLED), Tokushima University, [2]Graduate School of Sciences and Technology for Innovation, Tokushima University

We present long-term operation and reproducibility of soliton comb generated from a fiber-conneted Si_3N_4 microresonator through high-power pumping and temperature control, respectively. Our results showed more than 50 times improvement in comb operation performance.

ALPS-I3-04 15:30

Raman combs generation in integrated silicon nitride microresonators

Arghadeep Pal[1,2], Alekhya Ghosh[1,2], Shuangyou Zhang[3], Toby Bi[1,2], Masoud Kheyri[1,2], Haochen Yan[1,2], Yaojing Zhang[4], Pascal Del'Haye[1,2]
[1]Max Planck Institute for the Science of Light, [2]Department of Physics, Friedrich-Alexander-Universität Erlangen-Nürnberg, [3]Department of Electrical and Photonics Engineering, Technical University of Denmark, [4]School of Science and Engineering, The Chinese University of Hong Kong (Shenzhen)

We demonstrate the observation of Raman lasing and Raman-Kerr combs in silicon-nitride microresonators. Engineering the resonator's structure, the optical mode-overlaps with the core, and cladding induce the interaction of the Kerr and Raman effects.

BISC <Room 419>

BISC2-06 15:15

Non-contact estimation of percutaneous arterial oxygen saturation from RGB facial video without pulse detection

Izumi Nishidate[1], Yuki Nagahama[2], Nodoka Nagao[1], Haruta Suzuki[1], Yasuaki Kokubo[3]
[1]Graduate School of Bio-Applications & Systems Engineering, Tokyo University of Agriculture and Technology, [2]Department of Biomedical Engineering, Tokyo University of Agriculture and Technology, [3]Department of Neurosurgery, Faculty of Medicine, Yamagata University

We investigated a method to estimate SpO2 using a digital red–green–blue camera. *In vivo* experiments with human volunteers confirmed the comparability of the proposed method with a commercially available pulse oximeter.

BISC2-07 15:30 ***Invited***

High-Performance Quantitative Phase Imaging using a Single Polarization Modulated Diffractive Optical Element

Junwei Min[1], Yuge Xue[1,2], Chen Bai[1], Xiaohao Xu[1], Shaohui Yan[1], Baoli Yao[1,2]
[1]Chinese Academy of Sciences, [2]University of Chinese Academy of Sciences

A novel compact and high-performance QPI based on orthogonal lateral shearing interferometry by integrating a selfdesigned polarization-modulated diffractive optical element in front of a regular digital camera sensor has been proposed. The single-shot recording and reconstruction archives real-time imaging and polarization multiplexing improves space bandwidth product utilization.

HEDS <Room 311+312>

[HEDS7] 15:20-16:00
WDM and radiations
Chair: Motoaki Nakatsutsumi
European XFEL

HEDS7-02 15:20

Computational Analysis of Anomalous K-edge Absorption Structure of Warm Dense Copper Ionized by High-Intensity X-ray Pulse

Shinsuke Fujioka[1], Yuichi Inubushi[2,3], Ichiro Inoue[3], Kensuke Tono[2,3], Makina Yabashi[2,3], Tomoyuki Johzaki[4,1], Shinichi Namba[4]
[1]The University of Osaka, [2]Japan Synchrotron Radiation Research Institute, [3]RIKEN SPring-8 Center, [4]Hiroshima University

The absorption spectrum of copper was measured using the X-ray free-electron laser SACLA. Prism-SPECT, with a FAC atomic database, was used to calculate spectra, accounting for photoionization and varying electron temperatures. A linear combination of multiple temperatures reproduced the experimental results. The XFEL heated the foil to several tens of eV.

HEDS7-03 15:40

New Bounds on Heavy Axions with an X-ray Free Electron Laser

J. Halliday[1,2,3], G. Marocco[4], K. Beyer[5], C. Heaton[1], M. Nakatsutsumi[6], T. Preston[6], C. Arrowsmith[1], C. Baehtz[7], S. Goede[6], O. Humphries[6], A. Garcia[7], R. Plackett[1], P. Svensson[1], G. Vacalis[1], J. Wark[1], D. Wood[1], U. Zastrau[6], R. Bingham[3,8], S. Sarkar[1], Gianluca Gregori[1]
[1]University of Oxford, [2]Imperial College London, [3]Rutherford Appleton Laboratory, [4]Lawrence Berkeley National Laboratory, [5]Max-Planck-Institut f˙ur Kernphysik Saupfercheckweg, [6]European XFEL, [7]Helmholtz-Zentrum Dresden-Rossendorf, [8]University of Strathclyde

The axion, a theoretical particle arising from the breaking of Peccei-Quinn (PQ) symmetry, was proposed to explain the absence of CP violation in quantum chromodynamics (QCD).

Oral, Wednesday, 23 April PM

LSC <Room 421> | META <Room 411>

LSC2-02 15:20 *Invited*

Laser-driven soft-X-ray sources for studying ultrafast electron and spin dynamic

Daniel Schick
Max Born Institut, Berlin, Germany

Here, we present an overview of experiments that have been recently enabled by a 2-µm-driven high-harmonic source in the photon energy range from 100-500 eV with 30 fs temporal resolution. We employ the source to follow the depth-resolved dynamics of spins and phonons, as well as 2D electronic structures at oxide interfaces by resonant, energy-dispersive scattering techniques.

LSC2-03 15:40

MicroMAX: A new MX beamline at MAX IV for exploring the structural dynamics of biomolecules

Manoop Chenchiliyan, Oskar Aurelius, Mirko Milas, Cecilia Casadei, Monika Bjelcic, Dean Lang, Jie Nan, Elmir Jagudin, Mikel Eguiraun, Alberto Nardella, Staffan Benedictsson, Siwen An, Afshan Begum, Ana Gonzalez, Thomas Ursby
MAX IV Laboratory, Lund University, Fotongatan 2, 224 84 Lund, Sweden.

MAX IV Laboratory, the world's first fourth-generation light source, is revolutionizing research with its ultra-bright and coherent X-rays. Building on this success, MAX IV now introduces MicroMAX, a cutting-edge MX beamline enabling researchers to explore the structural dynamics of biomolecules. This presentation will showcase the advanced capabilities of MicroMAX and how it empowers researchers to make groundbreaking discoveries.

META4-02 15:30

Quantum Photon Emitters Enabled by hBN Protective Layers

Po-Sheng Shi[1], Chia-Hung Wu[2], Ming-Jyun Ye[2], Kuo-Ping Chen[1]
[1]National Tsing Hua University, [2]National Yang Ming Chiao Tung University

Quantum photon emitters in 2D materials like hBN show promise for quantum photonics. This work utilizes hBN protective layers to enhance defect stability and emission efficiency under electron beam exposure.

META4-03 15:45

Miniature Q-plate structures realized using 3D femtosecond laser printing technique in photoresist

Darius Gailevicius[2], Domas Paipulas[2], Maciej Kretkowski[1], Saulius Juodkazis[3], Vygantas Mizeikis[1]
[1]Shizuoka University, [2]Vilnius University, [3]Swinburne University of Technology

Realization of form birefringent Q-plate structures for visible wavelength range using 3D laser printing technique in polymeric photoresist is reported, and optical characterization of the fabricated structures is described.

OPTM8-05 15:45

Study of the Effects of Confined Water Vapor in Mesoporous Silica on its Thermal Insulation for Energy Storage Applications

Okky Fajar Tri Maryana[1], Abdulaziz Aljalal[1], Sameer Qari[1], Watheq Al-Basheer[2], Khaled Gasmi[3], Muhammad Tahir[4], Ayu Wahyuni[4]

[1]Department of Physics, King Fahd University of Petroleum & Minerals, Dhahran 31261, Saudi Arabia, [2]Interdisciplinary Research Center of Membranes and Water Security, King Fahd University of Petroleum & Minerals, Dhahran 31261 Saudi Arabia, [3]Interdisciplinary Research Center for Intelligent Manufacturing and Robotics, King Fahd University of Petroleum & Minerals, Dhahran 31261 Saudi Arabia, [4]Department of Chemistry, King Fahd University of Petroleum & Minerals, Dhahran 31261, Saudi Arabia.

Developing advanced thermal insulation materials is crucial for energy storage systems. Mesoporous silica, with its high surface area and tunable pores, shows promise for such applications. Using Gas in Scattering Media Absorption Spectroscopy (GASMAS), we studied confined water vapor's effects on thermal conductivity. Results reveal reduced conductivity under specific conditions, enhancing insulation properties for efficient energy storage.

Oral, Wednesday, 23 April PM

Oral, Thursday, 24 April AM

ALPS <Room 303>

[ALPS-I4] 9:15-10:15
Optical frequency combs / Frequency stabilized lasers and applications (4)
Chair: Akifumi Asahara
UEC

ALPS-I4-01 9:15 *Invited*

Extreme ultraviolet optical frequency combs and applications

Jorge Moreno[1], Florian Egli[1], Muhammad Thariq[1], Johannes Weitenberg[1,2], Fabian Schmid[1], Takashi Sukegawa[3], Theodor W. Hänsch[1,4], Thomas Udem[1,4], Akira Ozawa[1]
[1]Max-Planck-Institute of Quantum Optics, [2]Fraunhofer-Institut für Lasertechnik ILT, [3]Canon Inc., [4]Fakultät für Physik, Ludwig-Maximilians-Universität München

The extreme ultraviolet (XUV) frequency comb extends optical frequency metrology into the unexplored wavelength range below 200 nm. Applications include precision spectroscopy for fundamental physics, optical clocks and laser cooling in the XUV regime.

ALPS-I4-02 9:45

Handheld-sized All-PM Fiber Laser Frequency Comb With Low Noise

Hao Ouyang, Jiayang Chen, Yuxuan Ma, Guanhao Wu
Tsinghua University

A compact all-PM Er: fiber optical frequency comb was developed, featuring low phase noise and high environmental stability. The low noise performance and miniaturized design make it practical for field and portable applications.

ALPS <Room 511+512>

[ALPS-G1] 9:15-10:15
Plasmonic Nanomaterials and Applications
Chair: Kentaro Iwami
Tokyo University of Agriculture and Technology

ALPS-G1-01 9:15 *Invited*

Visible plasmon properties of colloidal intermetallic compound nanoparticles

Haruka Takekuma[1,2], Ryota Sato[2], Kenji Iida[3], Toshiharu Teranishi[1,2]
[1]Graduate School of Science, Kyoto University, [2]Institute for Chemical Research, Kyoto University, [3]Institute for Catalysis, Hokkaido University

Intermetallic compound nanoparticles with an ordered crystal structure exhibit unique LSPR properties, expanding the library of plasmonic materials. LSPR of $PtIn_2$ nanoparticles with a CaF_2-type structure is similar to that of fcc-Au nanoparticles.

ALPS-G1-02 9:45

Thermal annealing-induced LSPR tuning and enhanced light scattering in silver and gold nanodisks

Kota Yamasaki[1], Yuto Tanaka[1], Tetsuya Matsuyama[1], Kenji Wada[2], Koichi Okamoto[1]
[1]Department of Physics and Electronics, Osaka Metropolitan University, [2]Equipment Sharing Center for Advanced Research and Innovation, Osaka Metropolitan University

We observed an enhanced scattering intensity induced by thermal annealing in silver and gold nanodisks fabricated using Electron Beam Lithography (EBL). The mechanism was investigated using the Finite Difference Time Domain (FDTD) method.

BISC <Room 419>

[BISC3] 9:00-10:30
Optical Coherence Tomography
Chair: Tatsutoshi Shioda
Saitama University

BISC3-01 9:00

Harmonic Optical Coherence Tomography - Towards Ultra-widefield Swept-Source Imaging

Dorian R. Urban[1,2], Pavel Novak[1], Miguel A. Preciado[1], Tom Vettenburg[2,3]
[1]Optos PLC, Queensferry House, Enterprise Way, Dunfermline, KY11 8GR, Scotland, UK, [2]School of Science and Engineering, University of Dundee, Nethergate, Scotland, DD1 4HN, UK, [3]Centre for Medical Engineering and Technology, University of Dundee, Scotland, DD1 4HN UK

Harmonic OCT enables high-speed high-volume imaging by combining opto-electronic phase modulation with digital dispersion compensation. We demonstrate an effective eight-fold extension of the imaging range with a 400 kHz scan-rate, ideal for wide-field clinical OCT.

BISC3-02 9:15

Multi-dynamics imaging by optical coherence tomography for assessing intratissue dynamics-domain structures

Rion Morishita[1], Ibrahim Abd El-Sadek[1,2], Pradipta Mukherjee[1,3], Hirofumi Yogo[4], Nobuharu Asai[5], Naoki Takeno[4], Shungo Araki[5], Atsuko Furukawa[6], Donny Lukmanto[7], Shinichi Fukuda[7,8], Satoshi Matsusaka[6], Shuichi Makita[1], Yoshiaki Yasuno[1]
[1]Computational Optics Group, University of Tsukuba, [2]Department of Physics, Faculty of Science, Damietta University, [3]Centre for Biomedical Engineering, Indian Institute of Technology Delhi, [4]Advanced Technology Institute, NIDEK CO., LTD., [5]Bioengineering Institute, NIDEK CO., LTD., [6]Clinical Research and Regional Innovation, Faculty of Medicine, University of Tsukuba, [7]Laboratory of Advanced Vision Science, Faculty of Medicine, University of Tsukuba, [8]Department of Ophthalmology, Faculty of Medicine, University of Tsukuba

We demonstrate a meta-contrast formation based on multi-contrast dynamic optical coherence tomography microscope. The method is applied to an *in vitro* corneal cell culture and revealed its microscopic structural and functional degradation over several hours.

BISC3-03 9:30

Zero-NA optical coherence microscope for structural and metabolic imaging of cancer spheroid

Suzuyo Komeda[1], Nobuhisa Tateno[1], Ann Marina Detje[2], Xibo Wang[1], Yue Zhu[3], Atsuko Furukawa[4], Rion Morishita[1], Ibrahim Abd El-Sadek[1,5], Shuichi Makita[1], Yoko Miura[2], Satoshi Matsusaka[4], Yoshiaki Yasuno[1]
[1]Computational Optics Group, University of Tsukuba, [2]University of Lübeck, [3]Nanjing University of Science and Technology, [4]Faculty of Medicine, University of Tsukuba, [5]Damietta University

We demonstrate a new high-resolution optical coherence microscopy, so-called Zero-NA OCM for cancer-spheroid investigation. The optical configurations and several computational augmentations of the Zero-NA OCM revealed cellular-scale structural and dynamic property of the samples.

BISC3-04 9:45

Deep learning based high-speed amplitude spectral dynamic OCT

Yusong Liu[1], Ibrahim Abd El Sadek[1,2], Cunyou Bao[1], Atsuko Furukawa[3], Satoshi Matsusaka[3], Yoshiaki Yasuno[1]
[1]Computational Optics Group, Univsity of Tsukuba, [2]Department of Physics, Faculty of Science, Damietta Univsity, [3]Clinical Research and Regional Innovation, Faculty of Medicine, University of Tsukuba

A neural network generating amplitude-spectra-based dynamic OCT (AS-DOCT) from only 16 OCT frames is demonstrated. It reduces the measurement time for 96.9% and enables a volumetric acquisition time of 26s.

HEDS <Room 311+312>

[HEDS8] 9:00-9:50
High pressure material 2
Chair: Alexander Pirozhkov
QST

HEDS8-01 9:00 *Invited*

Experimental Study of Iiron Oxides at Earth's Mantle and Outer Core Conditions via Laser-Driven Shock Compression at an X-ray Free Electron Laser (XFEL)

Celine Crepisson[1], Patrick Heighway[1], Mila Fitzgerald[1], Thomas Stevens[1], Domenic Peake[1], Alexis Amouretti[2], Marion Harmand[3], David McGonegle[4], Sam Azadi[1], Danae Polsin[5], David Alexander Chin[5], Justin Wark[1], Chrystele Sanloup[6], Karim Alaa El-Din[1], Harry Taylor[1], Kohdai Yamamoto[2], Norimasa Ozaki[2,7], Kohei Miyanishi[8], Yizhen Wang[1], Adrien Descamps[9], Carolina Camarda[10], Erik Brambrink[10], Karen Appel[10], Christian Sternemann[11], Lea Pennacchioni[12], Khachiwan Buakor[10], Sam Vinko[1,13]
[1]Physics department, University of Oxford, [2]Graduate School of Engineering, Osaka University, Suita, Osaka 565-0871, Japan, [3]PIMM, Arts et Metiers Institute of Technology, CNRS, Cnam, HESAM University, 151 boulevard de l'Hopital, 75013 Paris, France, [4]AWE, Aldermaston, Reading, RG7 4PR, UK, [5]University of Rochester Laboratory for Laser Energetics, Rochester, NY, USA, [6]Sorbonne Universite, CNRS, Museum National d'Histoire Naturelle, Institut de Mineralogie, de Physique des materiaux et de Cosmochimie, UMR7590, Paris, France, [7]Institute of Laser Engineering, Osaka University, Suita, Osaka 565-0871, Japan, [8]RIKEN SPring-8 Center, Hyogo 679-5148, Japan, [9]School of Mathematics and Physics, Queen's University Belfast, University Road, Belfast BT7 1NN, UK, [10]European XFEL GmbH, Holzkoppel 4 22869 Schenefeld, Germany, [11]Fakultät Physik / DELTA, Technische Universität Dortmund, Maria-Goeppert-Mayer-Str. 2, 44227 Dortmund, Germany, [12]Potsdam University, Am Neuen Palais 10, 14469 Potsdam, Germany, [13]Central Laser Facility, STFC Rutherford Appleton Laboratory, Didcot OX11 0QX, UK

Iron oxides are present in the Earth's mantle, and oxygen represents up to 5% in the iron-rich liquid outer core. They are of interest to understand seismic observations, possible outer-core layering and geodynamo. We present new results on FeO and Fe_2O_3 using laser-driven shock compression to retrieve electronic and ionic structures in solid and structure of liquids via X-ray Emission Spectroscopy and X-ray Diffraction, up to 300 GPa.

HEDS8-02 9:25 *Invited*

Ultrafast Single-Shot Imaging Based on Temporal Wavelength Division for Capturing Plasma Dynamics from Subpicosecond to Nanosecond Timescales

Keitaro Shimada
The University of Tokyo

We developed an imaging system enabling single-shot visualization of ultrafast laser-induced plasma dynamics. Our approach utilizes advanced spectral techniques to capture ablation phenomena across subpicosecond to nanosecond timescales for diverse scientific applications.

[HEDS9] 9:50-10:20
Poster Flash Talk
Chair: Natsumi Iwata
Osaka University

HEDS9-01 9:50

Investigation of spin transition in laser shock compressed Fe_2O_3

HEDS9-02 9:52

Ionic transport properties in C–H–O ternary superionicity at planetary interior conditions

HEDS9-04 9:56

Study on structure change of laser-irradiated targets using ab-initio and classical molecular dynamics calculations

Oral, Thursday, 24 April AM

LSC <Room 421>

[LSC3] 9:00-10:30
Time resolved (1)
Chair: Hiroshi Watanabe
Osaka University

LSC3-01 9:00 ***Invited***

Time-resolved ARPES with 10-fs temporal resolution

Katsuya Oguri[1],Kohei Nagai[1], Ryo Yoshioka[1,2], Takuya Okamoto[1], Kento Hiura[1,2], Yasushi Shinohara[1,3], Yoji Kunihashi[1], Keiko Kato[4], Hiroki Mashiko[5], Yoshiaki Sekine[1], Hiroki Hibino[6], Ikufumi Katayama[2], Jun Takeda[2], Haruki Sanada[1]
[1]NTT Basic Research Laboratories, NTT Corporation, [2]Department of Physics, Yokohama National University, [3]Research Center for Theoretical Quantum Information, NTT Corporation, [4]Department of Chemistry, Nagoya University, [5]Center for Ultrafast Intense Laser Science, The University of Tokyo, [6]School of Science and Technology, Kwansei Gakuin University

LSC3-02 9:20 ***Invited***

Time-resaolved ARPES and XRD study for transition metal ditelurides

Takeshi Suzuki
ISSP, The University of Tokyo

Group-5 transition metal ditellurides (VTe2, NbTe2, TaTe2) exhibit unique CDW properties. We will discuss the ultrafast electron and lattice dynamcis during the CDW melting measured by time-resolved ARPES and XRD.

LSC3-03 9:40 ***Invited***

Crystallization kinetics of rare-gas nanoparticles studied by single-particle X-ray diffraction

Akinobu Niozu
Hiroshima University

The structures of single rare-gas nanoparticles produced by supersonic gas expansion were investigated by single-shot and single-particle X-ray diffraction using XFEL. The single-particle diffraction data suggested the coestistence of rhcp and fcc phases in single-nanoparticles. The observations provided insights into the crystallization kintetics of rare-gas nanoparticles.

META <Room 411>

[META5] 9:00-10:30
Session 5
Chair: Din-Ping Tsai
City University of Hong Kong

META5-01 9:00 ***Invited***

Metasurface Devices for High-Speed Optical Communication

Takuo Tanemura, Go Soma, Kento Komatsu, Chun Ren, Yusuke Tsubai
The University of Tokyo

Using ultrathin metasurfaces composed of silicon nanoposts, we have demonstrated various functional devices operating at 1550-nm wavelength for high-speed optical communication systems, including spatially scalable dual-polarization coherent transceivers and compact spatial/polarization mode multiplexers.

META5-02 9:30 ***Invited***

Highly sensitive vibrational spectroscopy based all-dielectric metaphotonics

Taka-aki Yano
Tokushima University

Dielectric nanostructures with high refractive index and low loss enable sensitive molecular spectroscopies by engineering Mie resonances from visible to mid-infrared. This talk highlights progress in field-enhanced spectroscopies and molecular sensing applications using these structures.

OMC <Room 418>

[OMC7] 9:00-10:15
Session 5
Chair: Mikael Käll
Chalmers University of Technology

OMC7-01 9:00 ***Invited***

Higher-Order Topological Insulators in Photonic Metamaterials

Lei Zhou
Fudan University

We demonstrate that a cylinder with an *arbitrary* cross section, composed of a *homogeneous* electromagnetic medium with nontrivial second Chern numbers in a synthetic five-dimensional space, can exhibit topologically protected HOTI-type hinge states.

OMC7-02 9:30

The Effect of NVP-Doped PQ/PMMA Holographic Storage Material on Holographic Performance

Lin Peng[1], Junchao Jin[1], Junhui Wu[1], Hongjie Liu[1], Shujun Zheng[1], Ruying Xiong[1], Xu Zheng[1], Xueyan Chen[1], Xiao Lin[1,2,3], Xiaodi Tan[1,2,3]
[1]Fujian Normal University, [2]Fujian Provincial Key Laboratory of Photonics Technology, [3]Key Laboratory of Opto-Electronic Science and Technology for Medicine of Ministry of Education

Holographic storage technology provides a new approach for multi-dimensional data storage. In the process of implementing holographic storage, the choice of storage material is crucial.

OMC7-03 9:45

Designing DUV Chiral Plasmonic Nanostructures via Aluminum-Based Topology Optimization

Atsushi Taguchi, Keiji Sasaki
Hokkaido University

We present a topology optimization methodology adapted for metals to design chiral plasmonic nanostructures. Specifically, we successfully created a chiral nanogap antenna optimized for a 266 nm wavelength, utilizing plasmon-active aluminum in the deep ultraviolet.

Oral, Thursday, 24 April AM

OWPT <Room 416+417>

[OWPT6] 9:30-10:30
Session 6
Chair: Makito Miyoshi
Nagoya Institute of Tech.

OWPT6-01 9:30 *Invited*

RePowerSiC: High-Efficiency High-Power Laser Conversion Systems Based on SiC for Space Applications

Antonio J. Garcia-Loureiro[1], Javier Lozano[1], Enrique Comesaña[1], Florencia Almonacid[2], Eduardo F. Fernández[2], Haiyan Ou[3], Peter Wellmann[4], Mikael Syväjärvi[5], Massimo Camarda[6], Natalia Seoane[1]
[1]Universidade de Santiago de Compostela, [2]University of Jaén, [3]Technical University of Denmark, [4]Friedrich-Alexander-Universität Erlangen, [5]Alminica AB, [6]SenSiC

The RePowerSiC project can open a path to high-power energy transmission technology for space applications. We aim to develop novel ultra-efficient SiC Optical Power Converters for in-space energy transmission in the range of kW/cm^2 with efficiencies higher than 80% at extremely large distance. Preliminary results show that SiC-based OPCs can greatly improve the efficiency of the technology, increasing one order of magnitude the power density.

OWPT6-02 10:00

InAlN photovoltaic converters for optical wireless power transmissions in air and underwater

Pablo Sanmartín[1], Florencia Almonacid[1], Antonio García-Loureiro[2], Eduardo F. Fernández[1]
[1]University of Jaén, [2]University of Santiago de Compostela

Optical wireless power transfer (OWPT) offers a promising solution for high-power transmission, but its efficiency is limited by the poor performance of optical photovoltaic converters (OPCs) at high power densities. This study explores InAlN-based OPCs for atmospheric and underwater environments, achieving a theoretical photovoltaic efficiency of 75.5% at 150 W/cm2 and system efficiencies of 67.9% for 10 km in air and 51.9% for 20 m underwater.

TILA-LIC <Room 315>

[TILA-LIC4] 9:00-10:30
Particle acceleration
Chairs: Kei Thomas Takeya
Institute for Molecular Science, Japan
Yoichi Sato
RIKEN SPring-8 Center, Japan

TILA-LIC4-01 9:00 *Invited*

Coherently combined in time and space fiber laser array technology for driving particle acceleration and secondary radiation sources

Almantas Galvanauskas[1], Christopher Pasquale[1], Yanwen Jing[1], Alexander Rainville[1], Matthew Whittlesey[1], Bowei Yang[1], Bohan Zhou[1], Mingshu Chen[1], Michael Garner[1], Tayari Coleman[1], Siyun Chen[1,2], Qiang Du[2], Tong Zhou[2], Cameron Geddes[2]
[1]Gérard Mourou Center for Ultrafast Optical Science, University of Michigan, 2200 Bonisteel Blvd., Ann Arbor, MI 48109, USA, [2]Lawrence Berkeley National Laboratory, One Cyclotron Road, Berkeley, CA 94720, USA

Coherently combined ultrashort pulse fiber lasers, as the next generation laser drivers of wakefield acceleration and secondary radiation sources, will enable 3-4 orders of magnitude pulse repetition rate increase of TW-PW peak power ultrashort pulses.

TILA-LIC4-02 9:30 *Invited*

Development of a femtosecond-resolution compact ultrafast electron diffraction system

Young Uk Jeong[1,2], Ki-Han Lee[1,3], Kyu-Ha Jang[1], In Hyung Baek[1], Kyungwan Kim[3], Kitae Lee[1,2]
[1]Korea Atomic Energy Research Institute, Korea, [2]University of Science and Technology, Korea, [3]Chungbuk National University, Korea

We aim to realize a structure that increases the time performance of the reflective-type low-energy UED to the femtosecond region. For this purpose, we developed a stable femtosecond laser that generates photoelectron beam with a high repetition rate.

TILA-LIC4-03 10:00

Pulsed Intense Lyman-α Laser System

Yu Oishi[1], Kosuke Umeda[2], Sohtaro Kanda[1], Yutaka Ikedo[1], Shinki Nakamura[2], Koichiro Shimomura[1]
[1]High Energy Accelerator Research Organization, [2]Ibaraki University

An intense Lyman-alpha laser system has been developed for accelerator-based element particle beam science. Nd-doped YSAG ceramics with room-temperature bonding technology were applied for efficient amplification at 1062.78 nm, which is required for efficient Lyman-alpha generation.

XOPT <Room 313+314>

[XOPT6] 9:00-10:15
Imaging (III)
Chair: Gota Yamaguchi
RIKEN SPring-8 Center

XOPT6-01 9:00 *Invited*

Novel AI-Driven 3D and 4D Imaging Opportunities at High-Brilliance Sources

Pablo Villanueva Perez[1], Zisheng Yao[1], Yuhe Zhang[1], Zhe Hu[1], Eleni Myrto Asimakopoulou[1,2], Julia K. Rogalinski[1], Robert Klofkorn[3], Tobias Ritschel[4]
[1]Synchrotron Radiation Research and NanoLund, Lund University, Lund, Sweden, [2]MAX IV Laboratory, Lund University, Lund, Sweden, [3]Center for Mathematical Sciences, Lund University, Lund, Sweden, [4]Department of Computer Science, University College London, London, UK

In this talk, we will introduce novel approaches that leverage AI algorithms to enable new spatiotemporal resolutions at high-brilliance sources.

XOPT6-02 9:30 *Invited*

New Developments and Advanced Reconstruction Algorithms in Nano-Holotomography

Viktor Nikitin[1], Marcus Carlsson[2], Doga Gursoy[1], Rajmund Mokso[3], Peter Cloetens[4]
[1]Advanced Photon Source, [2]Lund University, [3]Technical University of Denmark, [4]European Synchrotron Radiation Facility

We present new reconstruction algorithms and a single-distance acquisition method using a shifting coded aperture that enhance efficiency in nano-holotomography with Projection X-ray Microscopes. This method overcomes the limitations of traditional multi-distance techniques, enabling artifact-free reconstructions with better temporal resolution. Validated at ESRF beamline ID16A, it enables dynamic, high-resolution imaging for operando studies.

XOPT6-03 10:00

Comparison of Synchrotron X-ray CT volumes and Lab-based X-ray CT volumes towards Industrial Applications

Yukie Nagai, Yutaka Ohtake
The University of Tokyo

Nondestructive testing is a manufacturing process for which X-ray CT scanning is effective. We discuss the difference of CT datasets obtained by lab-based CT scanners and Spring-8 for parts-segmentation, a necessary process for nondestructive testing.

NOTE

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ALPS <Room 303>

ALPS-I4-03 10:00

Full stabilization of three optical frequency combs

Tatsuki Murakami, Riku Shibata, Shinichi Watanabe
Keio University

Three optical frequency combs are fully stabilized and coherent averaging of the interferogram is possible. We present the stabilization scheme and the interference measurement, enhancing various applications such as spectroscopy and ranging.

----- Coffee Break 10:15-10:30 -----

[ALPSp2] 10:30-12:00
ALPS Poster Session 2
<Exhibition Hall A>

Poster session program p.141-

ALPS <Room 511+512>

ALPS-G1-03 10:00

Surface Plasmon Enhanced Photoluminescence from CdSe/ZnS Quantum Dots on Ag Random Grain Structures of Various Sizes Tuned by Thermal Annealing

Tomohiko Niwa[1], Haruki Hirauchi[1], Tetsuya Matsuyama[1], Kenji Wada[2], Koichi Okamoto[1]
[1]Department of Physics and Electronics, Osaka Metropolitan University, [2]Equipment Sharing Center for Advanced Research and Innovation, Osaka Metropolitan University

We achieved a 42-fold photoluminescence (PL) enhancement from CdSe/ZnS Quantum Dots (QDs) through surface plasmon (SP) resonance of Ag random grain structures, and demonstrated the potential for applications in optoelectronic devices.

----- Coffee Break 10:15-10:30 -----

BISC <Room 419>

BISC3-05 10:00

***In vivo* multi-contrast imaging of zebrafish by dynamic Jones-matrix optical coherence tomography**

Cunyou Bao[1], Aiyi Sui[1], Ibrahim Abd El-Sadek[1,2], Rion Morishita[1], Yu Guo[1], Yiheng Lim[1], Shuichi Makita[1], Makoto Kobayashi[1], Yoshiaki Yasuno[1]
[1]University of Tsukuba, [2]Damietta University

We demonstrate multi-contrast optical coherence tomography (OCT) imaging of in vivo zebrafish, which includes the dynamic OCT, polarization-sensitive OCT and conventional scattering OCT. The characteristic features of zebrafish were visualized through the multi-contrast images.

BISC3-06 10:15

Application of galvometer scanning optical coherence tomography for biological tissue imaging

Pai Yu Cheng[1,2], Yuan Luo[3,4,5]
[1]Department of Biomedical Engineering, National Taiwan University, [2]Divisions of Urology, Department of Surgery, Far Eastern Memorial Hospital, [3]Institute of Medical Device and Imaging, National Taiwan University, [4]YongLin Institute of Health, National Taiwan University, [5]Program for Precision Health and Intelligent Medicine, National Taiwan University

Optical coherence tomography (OCT) enables high-resolution cross-sectional imaging but faces challenges with artifacts in tissue imaging. A galvometer scanning spectral-domain OCT with cellular resolution and optimized imaging via gate matching and signal processing is demonstrated.

----- Coffee Break 10:30-11:00 -----

[BISC4] 11:00-12:15
Imaging Instrumentation and Techniques
Chair: Masaki Hisaka
Osaka Electro-Communication University

BISC4-01 11:00

Optical Hardness Meter for Diagnosis of Dental Root Caries

Hisanao Hazama
The University of Osaka

A hardness meter using an indenter with light for tooth monitoring (HAMILTOM) is proposed to quantitatively measure the hardness of *in vivo* teeth for diagnosis of dental root caries.

HEDS <Room 311+312>

HEDS9-05 9:58

A Machine Learning Study of Properties of D_2O up to 8 Million Kelvin from First Principles

HEDS9-06 10:00

Laboratory Measurement of L-Shell Opacity at GEKKO XII/LFEX High Power Laser Facility

HEDS9-07 10:02

Role of resistivity and pressure structure in energy transport in laser-generated high energy density plasmas

HEDS9-08 10:04

Origin of the Crab's Filaments and Their Roles on σ- and κ- Problems

HEDS9-10 10:08

Laser light propagation from relativistic transparency regime to hole boring regime

HEDS9-11 10:10

Achieving Efficient Heating of High-Density Plasma by Multi-Picosecond PW Laser Driven Thermal Waves

HEDS9-12 10:12

Monodirectional-drive inertial confinement fusion using ultra-high intensity laser for bright pulsed point neutron source

HEDS9-13 10:14

Fast-electron generation by kinetic laser-plasma interactions in sub-relativistic regime

HEDS9-14 10:16

Three-dimensional Simulation of Multi-ion Acceleration by Laser-driven Magnetic Reconnection

HEDS9-15 10:18

Investigation of the origin of hot electrons in cluster-beam laser experiments

----- Coffee Break 10:20-10:35 -----

[HEDS10] 10:35-12:30
Plasma kinetics 1
Chair: Hui Chen
Lawrence Livermore National Laboratory

HEDS10-01 10:35 ***Invited***

Generation of GeV Proton Beams by Micronozzle Acceleration

Masakatsu Murakami[1], D. Balusu[1,2], Y. Murakami[1], S. Maruyama[1], B. Ramakrishna[2]
[1]The University of Osaka, [2]Indian Institute Technology Hyderabad

We propose a novel ion acceleration scheme, micronozzle acceleration (MNA), which generates proton beams with kinetic energies on the giga-electron-volt (GeV) order. The underlying physics and performance of MNA are studied with two-dimensional particle-in-cell simulations.

HEDS10-02 11:00 ***Invited***

Relativistic bulk medium driven by BRA (transient bifurcation-induced rocket acceleration) by the designed high-intensity laser irradiation to a solid hydrogen

Ryutaro Matsui[1,2], Yasuaki Kishimoto[1,2,3]
[1]Graduate School of Energy Science, Kyoto University, [2]Non-linear/Non-equilibrium Plasma Unit, Kyoto University, [3]Institute of Advanced Energy, Kyoto University

We present a new boosting scheme, which is referred to as transient bifurcation-induced rocket acceleration (BRA), leading to a relativistic bulk medium based on transient bifurcation of nonlinear waves induced by designed high-intensity lasers.

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LSC <Room 421>

LSC3-04 10:00

Transient structures of organic molecular crystal observed by time-resolved electron diffraction measurements

Kaito En-ya[1], Ami Takada[2], Gaël Privault[3], Masaki Saigo[2], Yasuhiro Ikabata[4], Kiyoshi Miyata[2], Shintaro Kohata[5], Yuri Saida[1], Hiroo Suzuki[6], Tadahiko Ishikawa[7], Makoto Kuwahara[8], Yoichi Yamada[3,9], Yasuhiko Hayashi[6], Shin-ya Koshihara[7], Hitoshi Goto[4], Hajime Nakanotani[5], Ken Onda[2], Chihaya Adachi[5], Masaki Hada[3,10]
[1]Degree Programs in Pure and Applied Sciences, University of Tsukuba, [2]Kyushu University, [3]Institute of Pure and Applied Science, University of Tsukuba, [4]Toyohashi University of Technology, [5]Center for Organic Photonics and Electronics Research, [6]Okayama University, [7]Institute of Science Tokyo, [8]Nagoya University, [9]Malaysia Japan International Institute of Technology, [10]Tsukuba Research Center for Energy Materials Science

We performed time-resolved electron diffraction measurements on a representative organic light-emitting molecular single crystal. Upon near-UV excitation, the molecules showed twisted motion at sub-nanoseconds involved by the spin-flipping process and relaxed on the sub-millisecond timescale.

LSC3-05 10:15

Investigating Structural Changes in Organic Molecules composed solely of Light Atoms using Time-Resolved x-ray Solution Scattering

Youngmin Kim, Shunsuke Nozawa, Ryo Fukaya, Shin-ichi Adachi
High Energy Accelerator Research Organization

Time-resolved X-ray solution scattering (TR-XSS) is a powerful experimental. However, untill now, the TR-XSS studies has been on materials containing heavy atoms. However, For TR-XSS to be a useful tool in these various fields, it is essential to extend its application to the study of organic molecules composed only of these lighter atoms. In this study, we successfully investigated structural changes in pure organic molecules without heavy atoms using TR-XSS.

----- Coffee Break 10:30-11:00 -----

[LSC4] 11:00-12:30
Time resolved (2)
Chair: Akinobu Niozu
Hiroshima University

LSC4-01 11:00 *Invited*

Pump-probe XAS Measurement Using a Liquid Cell for Soft X-rays

Fumitoshi Kumaki[1], Masanari Nagasaka[2], Ryo Fukaya[1,3], Jun-ichi Adachi[1]
[1]Institute of Materials Structure Science, KEK, [2]Institute of Molecular Science, [3]The Institute for Solid State Physics

Time-resolved soft X-ray absorption spectroscopy system developed at KEK-PF uses a liquid cell for soft X-ray measurements. In this study, we measured the photoreaction of iron phenanthroline complex solutions using the system and investigated the temperature dependence and solvent effects by taking advantage of the liquid cell. We will discuss the result and compare them with UV-Vis pump-probe measurements.

LSSE <Room 412>

[LSSE5] 10:00-11:50
Space Technology 1
Chair: Tadanori Fukushima
Orbital Lasers

LSSE5-01 10:00 *Invited*

Beam steering mirror with high-speed, high-precision, and high-thermal resistance for both the laser fusion reactor and laser shooting of space debris

Kazuhiro Agatsuma[1], Yuki Yoshimura[1], Masaki Ishii[1,2], Ryuji Mori[1], Kazuki Matsuo[1]
[1]EX-Fusion Inc., [2]The Graduate School for the Creation of New Photonics Industries (GPI)

We have developed a large size steering mirror (150 mm diameter) with a high-speed operation (10 Hz) and high precision (better than 0.6 micro radian), which is controlled by a back-side optical lever.

LSSE5-02 10:30 *Invited*

Status and next milestone of laser component of MOLI system

Daisuke Sakaizawa, Tsugumi Sakae, Masaru Ohmori, Tadashi Imai, Sumita Taishi
JAXA

The MOLI (Multi-sensing Observation Lidar and Imager) project started in August 2024. Currently in the preliminary design phase, MOLI integrates a lidar and 3-band imager (550–880 nm, 5 m resolution) for precise footprint localization. A Q-switched Nd:YAG laser (30 mJ, 150 Hz) operates within a pressurized enclosure, optimized for ISS conditions. The lidar system targets a canopy height accuracy of ±3 m with an S/N ratio above 7.

LSSE5-03 11:00 *Invited*

Picosecond pulsed solid-state laser for space applications

Norihito Saito, Kentaro Miyata, Akihiro Tanabashi, Michio Sakashita, Takayo Ogawa, Satoshi Wada
RIKEN Center for Advanced Photnics, RIKEN

This study aims to develop a diode-pumped solid-state ultrashort pulse laser capable of emitting a peak power of 1 GW at 1 μm for laser propulsion caused by laser ablation in space.

META <Room 411>

META5-03 10:00

Meta-device with dual-sided light-sheet illumination

Hung-Chuan Hsu[1,2,3], Chun Chun Chang[2,3], Sunil Vyas[2], Kuang-Yuh Huang[3], Takuo Tanaka[1,4], Din Ping Tsai[5,6,7], Yuan Luo[2,8]
[1]Innovative Photon Manipulation Research Team, RIKEN Center for Advanced Photonics, [2]Institute of Medical Device and Imaging, National Taiwan University, [3]Department of Mechanical Engineering, National Taiwan University, [4]Metamaterials Laboratory, RIKEN Cluster for Pioneering Research, [5]Department of Electrical Engineering, City University of Hong Kong, [6]Centre for Biosystems, Neuroscience, and Nanotechnology, City University of Hong Kong, [7]State Key Laboratory of Terahertz and Millimeter Waves, City University of Hong Kong, [8]YongLin Institute of Health, National Taiwan University

Light-sheet fluorescence microscopy (LSFM) is well-known for its benefits of large field of view, optical sectioning, and low photo-bleaching. However, single-sided illumination in LSFM encounters challenges like non-uniformity and shadow artifacts. Here, a compact meta-device using dual-sided light-sheet illumination is proposed to improve system compactness and enable diverse functionalities.

META5-04 10:15

Tunable Abrupt Autofocusing Meta-devices

Rong Lin, Jin Yao, Din Ping Tsai
City University of Hong Kong

We introduce two types of tunable abrupt autofocusing meta-devices composed of dual metasurfaces. By adjusting the relative rotation between these metasurfaces, the steering angle and focal length can be manipulated.

----- Coffee Break 10:30-11:00 -----

[META6] 11:00-12:00
Session 6
Chairs: Taka-aki Yano
Tokushima University
Din-Ping Tsai
City University of Hong Kong

META6-01 11:00

Low photon number and super-resolution displacement metrology

Shufan Chen[1], Yubin Fan[1], Hao Li[2], Xiaodong Qiu[1], Ben Wang[3], Lijian Zhang[3], Shumin Xiao[2], Din Ping Tsai[1]
[1]City University of Hong Kong, [2]Harbin Institute of Technology, [3]Nanjing University

Optical metasurface technology plays a vital role in optical measurement and sensing. The phase manipulation capability enables precise displacement measurement methods based on interference, especially in transverse displacement measurement. The metasurface's natural two-dimensional structure make it an ideal ruler for lateral displacement measurement. Our team has developed an experimental setup that surpasses existing measurement limits.

OMC <Room 418>

OMC7-04 10:00

Enantio-selective chiro-optical force nanoscopy for nanomaterials

Junsuke Yamanishi, Hyo-Yong Ahn, Hiromi Okamoto
Institute for Molecular Science

To fully understand and to obtain the full potential of chiro-optical effects, the local in-situ observation of the effects from individual components is essential. Here, we attempted the imaging of the nanoscale local chiro-optical effects based on a force imaging technique, photoinduced force microscopy. We achieved enantio-selective chiro-optical force nanoscopy of individual nanoparticles.

----- Coffee Break 10:15-10:45 -----

[OMC8] 10:45-12:00
Session 6
Chair: Keiji Sasaki
Hokkaido University

OMC8-01 10:45 *Invited*

Custom-tailored optical traps

Une Butaite[1], Christina Sharp[1], Michael Horodynski[3], Graham Gibson[2], Miles Padgett[2], Stefan Rotter[3], Jonathan Taylor[2], David Phillips[1]
[1]University of Exeter, [2]University of Glasgow, [3]Vienna University of Technology

While incredibly versatile, optical tweezers are not equally well-suited for all particles. In this work we optimise the spatial distribution of the trapping light field, with the aim of enhancing 3-dimensional trapping stiffness.

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OPTM <Room 213>

[OPTMp] 10:30-12:00
OPTM Poster Session
<Exhibition Hall A>

Poster session program p.144

OWPT <Room 416+417>

OWPT6-03 10:15

Device simulation based design of $CsPb(Br_{0.45}Cl_{0.55})_3$ photovoltaic power converter for blue light using Bayesian optimization

Kyohei Goi[1], Atsuto Watanabe[1], Yuejie Tan[1], Julian G. Fernandez[2], Javier F. Lozano[2], Antonio García-Loureiro[2], Shinsuke Miyajima[1]
[1]Institute of Science Tokyo, [2]Universidade de Santiago de Compostela

A superstrate-type $CsPb(Br_{0.45}Cl_{0.55})_3$ photovoltaic power converter was designed using device simulation combined with Bayesian optimization. The potential conversion efficiency of 67.3% for 450 nm blue light was demonstrated.

----- Coffee Break 10:30-11:00 -----

[OWPT7] 11:00-12:00
Session 7
Chair: Gen-ichi Hatakoshi
Waseda Univ.

OWPT7-01 11:00 ***Invited***

Photonic power converters based on InGaN, InGaP, CIGS and InGaAs for optical wireless power

Shiro Uchida
Chiba Institute if Technology

Photonic power converters based on InGaN, InGaP, CIGS and InGaAs for optical wireless power.

TILA-LIC <Room 315>

TILA-LIC4-04 10:15

Terahertz Waves Generation Using Near and Mid-Infrared Light Pumped by sub-ns 2J DFC-PowerChip Laser

Kei Takeya[1,2], Kenichi Hirosawa[3], Takunori Taira[2,1]
[1]Institute for Molecular Science, [2]RIKEN SPring-8 Center (RSC), [3]Mitsubishi Electric Corporation

We have previously demonstrated that a degenerate optical parametric system using a multiplexed reflective volume Bragg grating (VBG) and PPLN can generate two-wavelength excitation light for wavelength conversion. In this paper, we report the successful amplification of these two wavelengths, which serve as the source for difference-frequency generation, and further demonstrate the generation of terahertz (THz) waves using this two-wavelength light.

----- Coffee Break 10:30-11:00 -----

[TILA-LIC5] 11:00-12:00
TILA-LIC 2025 PLENARY II
Chair: Takunori Taira
RIKEN SPring-8 Center, Japan

TILA-LIC5-01 11:00 ***Invited***

Recent progress on nonlinear borate single crystals for the design of solid-state laser in the UV range

Gérard Aka[1], Slimane Raissi[1], Florent Cassouret[2], Pascal Loiseau[1], Takunori Taira[2], Patricia Segonds[3], Benoit Boulanger[3], Alexander Pisch[4]
[1]Chimie ParisTech - PSL University, [2]Division of Research Innovation and Collaboration, Institute for Molecular, Okazaki, [3]Univ. Grenoble Alpes, CNRS, Grenoble INP Institut Néel, [4]Univ. Grenoble Alpes, CNRS, Grenoble INP, SIMaP

The generation of UV light by means of nonlinear optical (NLO) processes from an infrared fundamental beam is indeed a promising path to design all solid-state UV lasers for various applications. Very few NLO crystals can achieve the last stage of frequency conversion towards UV, especially below 270 nm. The presentation will discussed recent progress on NLO borates crystals for solid-state laser conversion in the UV.

XOPT <Room 313+314>

----- Coffee Break 10:15-10:35 -----

[XOPT7] 10:35-11:20
XFEL
Chair: Yuya Kubota
RIKEN SPring-8 Center

XOPT7-01 10:35

Wavefront sensing at FELs: old tricks and new challenges with OAM beams, structured illumination and source metrology

Michele Manfredda
Elettra - Sincrotrone Trieste

Wavefront sensing is essential for precise photon transport and beam quality in FEL experiments. At FERMI, we use Hartmann wavefront sensors to diagnose and control complex beam shapes, including OAM beams, providing valuable insights into optics tuning and source metrology.

XOPT7-02 10:50

Shot-by-shot analysis of spatially varying spectra in soft X-ray free-electron laser

Yoko Takeo[1,2], Satoru Egawa[1], Kyota Yoshinaga[1,2], Kai Sakurai[1,2,3], Takashi Tanaka[2], Shigeki Owada[3,2], Hidekazu Mimura[1,2], Makina Yabashi[2,3], Takashi Kimura[1,2]
[1]The University of Tokyo, [2]RIKEN SPring-8 Center, [3]Japan Synchrotron Radiation Research Institute

The spectra of soft X-ray free-electron lasers vary shot-by-shot and with the emission angle from the source. We developed a single-shot imaging system using a transmission diffraction grating and total reflection mirrors to evaluate spatially varying spectra.

XOPT7-03 11:05

Arrival timing diagnostic tools at Shanghai Soft X-ray Free Electron Laser (SXFEL)

Zhi Qiao
ShanghaiTech Unversity

We report the first measurement of the pulse arriving time at Shanghai Soft X-ray Free Electron Laser (SXFEL) using both the spectral encoded method and spatial coupling method. With the help of the timing diagnostic tools, the single pulse timing jitter can be monitored with fast speed and high accuracy. The results indicate that the timing diagnostic tools can provide accurate measurement for pump probe experiments and may be used for XFEL machine status diagnostics.

NOTE

Oral, Thursday, 24 April AM

ALPS <Room 303>

[ALPSp2]

Poster session program p.141-

----- Lunch 12:00-13:45 -----

ALPS <Room 511+512>

----- Lunch 12:00-13:45 -----

BISC <Room 419>

BISC4-02 11:15

Optical dual gas sensor for simultaneous NO and O_2 detection using electrospun fibers containing $CsPbBr_3$ QDs and PtTFPP

Cheng-Shane Chu, Rispandi Mesin
Ming Chi University of Technology

The optical dual sensor utilizes electrospun fibers containing NO and O_2 sensitvie materials by mixing cellulose acetate (CA) polymer matrix with $CsPbBr_3$ QDs and platinum(II) meso-tetrakis (pentafluorophenyl) porphyrin (PtTFPP), respectively.

BISC4-03 11:30

Study on Prediction of Skin Tissue Parameters Using Differential Analysis of Skin Spectral Reflectance

Naomichi Yokoi[1], Arashi Hanaoka[1], Iori Kojima[2], Tomonori Yuasa[2], Yoshihisa Aizu[2]
[1]Chitose Institute of Science and Technology, [2]Muroran Institute of Technology

In the present study, the prediction of several skin tissue parameters from the estimated Sat-O_2 versus differential reflectance relation was attempted with the aid of similar relations obtained by MCS in advance.

BISC4-04 11:45

Development of a specific acoustic impedance microscopeusing a laser ultrasound

Kazuki Tamura, Shinpei Okawa
Hamamatsu University School of Medicine

This study proposes a novel method for measuring specific acoustic impedance using laser ultrasonics, utilizing the optical path of a standard inverted microscope. The proposed system generates thermoelastic waves through pulsed light irradiation, and reflected waves are detected with a laser Doppler vibrometer.

BISC4-05 12:00

Generation of Low-Coherence Dual Combs for 3D Distance Measurement

Satoshi Kanai, Yuki Sekiguchi, Kenta Arai, Tatsutoshi Shioda
Saitama University

We present a cost-effective, simplified dual-comb spectroscopy method using a polarization-maintaining fiber to generate two optical frequency combs from a low-coherence light source, achieving high-precision 3D surface shape measurements.

----- Lunch 12:15-13:30 -----

HEDS <Room 311+312>

HEDS10-03 11:25

Efficient heating of high-density plasmas by thermal diffusion with kinetic particle transport

Naoki Okuda[1], Natsumi Iwata[2], Yasuhiko Sentoku[2]
[1]Graduate School of Science, Osaka University, [2]ILE, Osaka University

Under irradiation of picoseconds laser pulse with relativistic intensity, thermal diffusion becomes comparable to fast electron energy transport in overdense plasma, driving the formation of rapidly propagating heat front.

HEDS10-04 11:45

K-shell X-ray Emission Properties of Heavy Ions in Nonequilibrium Plasmas Created by the Action of Superintense, Ultrashort 10 PW Laser Pulses at ELI-NP

Yuji Fukuda[1], Sergey N. Ryazantsev[2], Tatiana A. Pikuz[3], Kotaro kondo[1], Petru Ghenuche[4], Theodor Asavei[4], Mihail Cernaianu[4], Marius Gugiu[4], Vojtech Horný[4], Alexandru Magureanu[4], Viorel Nastasa[4], Paolo Tomassini[4], Lucian Tudor[4], Shinsuke Fujioka[5], Ryosuke Kodama[5], Tetsuya Kawachi[1], Sergey A. Pikuz[2], Kazuo A. Tanaka[4,5], Victor Malka[4], Domenico Doria[4]
[1]Kansai Institute for Photon Science (KPSI), QST, [2]HB11 Energy Holdings Pty Ltd., [3]Institute for Open and Transdisciplinary Research Initiatives (OTRI), Osaka University, [4]Extreme Light Infrastructure-Nuclear Physics (ELI-NP), IFIN-HH, [5]Institute of Laser Engineering (ILE), Osaka University

We report on the K-shell x-ray emission properties of heavy ions produced during the interaction of 10 PW laser pulses with micrometer-thick high-Z materials with Z up to 32. Spectroscopic data analysis with time-dependent plasma kinetics calculations and particle-in-cell (PIC) simulations will be presented, revealing the unique ionization properties of nonequilibrium plasmas created by the world's most powerful laser system.

HEDS10-05 12:05 ***Invited***

PIC simulations related to short focal 10 PW experiments at ELI-NP

Vojtěch Horný, Domenico Doria, Paolo Tomassini
Extreme Light Infrastructure - Nuclear Physics

We introduce the PIC simulations related to conducted and intended short focal 10 PW experiments at ELI NP. We select the investigation of the role of field and optical ionization mechanisms by irradiation of the metallic foils for elements with $Z = 28$-32, and proton acceleration mechanisms such as TNSA and an advanced double layer scheme.

----- Lunch 12:30-13:30 -----

Oral, Thursday, 24 April AM

LSC <Room 421>

LSC4-02 11:20 *Invited*

Photoinduced dynamics generated by unusual electron transfer channels in a one-dimensional van der Waals heterostructure

Masaki Hada
University of Tsukuba

Ultrafast photoinduced charge transfer through electronic channels from CNTs to BNNTs and the subsequent generation of radial phonons were observed at the interface of the 1D-vdW heterostructure by ultrafast time-resolved electron diffraction measurements.

LSC4-03 11:40 *Invited*

Ordered Structures in Zinc-blende III-V Ternary Semiconductors: A First-principles Approach

Hiroshi Mizuseki[1], Nobuhiko Sarukura[2,3], Yoshiyuki Kawazoe[3,4,5]
[1]Korea Institute of Science and Technology, [2]Institute of Laser Engineering, Osaka University, [3]New Industry Creation Hatchery Center, Tohoku University, [4]SRM Institute of Science and Technology, [5]Suranaree University of Technology

In this study, we investigated the presence of similar ordered configurations in zinc blende III-V compound semiconductors. The systems examined include $Al_xGa_{1-x}N$, $Al_xIn_{1-x}N$, $Ga_xIn_{1-x}N$, $Al_xGa_{1-x}P$, $Al_xIn_{1-x}P$, $Ga_xIn_{1-x}P$, $Al_xGa_{1-x}As$, $Al_xIn_{1-x}As$, and $Ga_xIn_{1-x}As$.

LSC4-04 12:00

Interaction of Electron Pulse with Terahertz Waves

Haruki Taira[1], Ryota Nishimori[1], Kaito En-ya[1], Godai Noyama[1], Gaël Privault[1], Yusuke Arashida[1], Kou Takubo[2], Shin-ya Koshihara[2], Shoji Yoshida[1], Masaki Hada[1]
[1]University of Tsukuba, [2]Institute of Science Tokyo

We developed a system to directly measure the temporal resolution of the ultrafast time-resolved electron diffraction setup, where the electrons are compressed by the radio frequency cavity, using the terahertz streaking method. The pulse duration was estimated to be less than 2 ps based on the streaked electron beam.

LSC4-05 12:15

Ferromagnetic-Resonance Instruments with NanoVNA

Reo Fukunaga[1], Ryunosuke Takahashi[1], Tetsurou Ueno[2], Hiroki Shoji[3], Yoshihiko Togawa[3], Hiroki Wadati[1,4]
[1]University of Hyogo, [2]Quantum Science and Technology, [3]Osaka Metropolitan University, [4]Osaka University

We developed a cost-effective ferromagnetic resonance (FMR) measurement system using NanoVNA. FMR of YIG thin films on GGG substrates was observed, showcasing the NanoVNA's potential for accessible spintronics research. Cost-saving strategies are introduced.

----- Lunch 12:30-13:50 -----

LSSE <Room 412>

LSSE5-04 11:30

Comparison among Side-Pump Combiners, End-Pump Combiners and WDM utilized in Erbium Ytterbium Doped Fiber Amplifier under Vacuum Conditions

Jiun-Jie Liau[1], Chin-Feng Su[1], Benson Shen[2]
[1]Photonicore Technologies Co., Ltd., [2]Lightel Technologies Inc.

This paper evaluates the advantages of side-pump combiners under thermal vacuum conditions and used in EYDFAs, including lower noise figures and higher output powers for EYDFAs compared to end-pump combiners and conventional WDM.

----- Lunch 11:50-13:00 -----

META <Room 411>

META6-02 11:15

Investigation into Light Field Modulation in Metasurface-Integrated Gallium Nitride Lasers

Miao Wang[1], Hong Xu[2], JueMin Yi[1], Bing Cao[2], Chinhua Wang[2], Jianfeng Wang, Ke Xu[1]
[1]Suzhou Institute of Nano-Tech and Nano-Bionics (SINANO), CAS, [2]Soochow University

Metasurfaces enable control of on-chip optical fields, integrating seamlessly with GaN devices and offering high coupling efficiency. This report details functional GaN metasurface structures that modulate laser light fields for efficient circular polarization and focusing, with applications in underwater and quantum communication, advanced displays, and biological optical tweezers.

META6-03 11:30

***In-vivo* intelligent optical sectioning endo-microscopy by meta-varifocal and neural network**

Yu-Hsin Chia[1,2], Yu-Xiang Wang[2,3], Min-Xuan Wang[2,4], Cheng Hung Chu[5], Sunil Vyas[2], Yi-You Huang[1,2,6], Din Ping Tsai[7,8,9], Yuan Luo[1,2,3]
[1]Department of Biomedical Engineering, National Taiwan University, [2]Institute of Medical Device and Imaging, National Taiwan University, [3]Program for Precision Health and Intelligent Medicine, National Taiwan University, [4]Department of Mechanical Engineering, National Taiwan University, [5]YongLin Institute of Health, National Taiwan University, [6]Department of Biomedical Engineering, National Taiwan University Hospital, [7]Department of Electrical Engineering, City University of Hong Kong, [8]Centre for Biosystems, Neuroscience and Nanotechnology, City University of Hong Kong, [9]The State Key Laboratory of Terahertz and Millimeter Waves, City University of Hong Kong

We propose an intelligent in-vivo fluorescence sectioning system using meta-varifocal endo-microscopy and deep learning. The telecentric design ensures constant magnification during axial scanning, enabling compact 3D imaging of mouse brains. HiLo imaging, integrated with a Moiré metalens, achieves optical sectioning while a ResNet-based model with 19 layers significantly reduces acquisition time and system complexity.

META6-04 11:45

Meta-microlens-array scanning confocal microscopy for biomedical imaging applications

Surag Athippillil Suresh[1], Chao-Ming Liu[2], Sunil Vyas[2], Cheng Hung Chu[2], Kuang-Yuh Huang[2], Takeshi Yamaguchi[3], Takuo Tanaka[3], J. Andrew Yeh[1], Din Ping Tsai[4], Yuan Luo[2]
[1]National Tsing Hua University, [2]National Taiwan University, [3]RIKEN Center for Advanced Photonics, [4]City University of Hong Kong

We developed a meta-microlens-array (meta-MLA) with metasurfaces and deep learning to enhance confocal fluorescence microscopy, achieving faster optical sectioning and clinical imaging potential.

----- Lunch 12:00-13:30 -----

OMC <Room 418>

OMC8-02 11:15

Helical Kelvin wave excitations on quantized vortices in superfluid heliu

Yosuke Minowa[1], Yuki Yasui[2], Tomo Nakagawa[3], Sosuke Inui[5,6], Makoto Tsubota[4], Masaaki Ashida[2]
[1]Kyoto University, [2]Osaka University, [3]Osaka City University, [4]Osaka Metropolitan University, [5]National MagLab, [6]Florida State University

We have demonstrated the direct excitation of helical Kelvin waves on quantized vortices in superfluid helium. We applied an oscillating electric field to charged silicon nanoparticles decorating the vortex cores, thereby inducing Kelvin waves.

OMC8-03 11:30

Fractional optical vortex induced chiral surface reliefs in azopolymer

Junjie Zhao[1], Kazuro Kizaki[1], Madoka Ono[1], Takashige Omatsu[2,3]
[1]Department of Applied Physics, Graduate School of Engineering, Tohoku University, [2]Graduate School of Science and Engineering, Chiba University, [3]Molecular Chirality Research Center, Chiba University

We report the first fabrication of chiral surface reliefs on azopolymer with odd number of spiral arms by irradiating fractional optical vortices and with the assistance of the spin angular momentum.

OMC8-04 11:45

Chiroptical response of a plasmonic particle array with a chiral arrangement under modal coupling regime

Tomoya Oshikiri[1,2], Yasutaka Matsuo[2], Hiromasa Niinomi[1], Masaru Nakagawa[1]
[1]Tohoku University, [2]Hokkaido University

We demonstrate that collective mode formation under modal coupling regime between localized surface plasmon resonances with a chiral arrangement of gold nanodisks and Fabry–Pérot nanocavity modes can induce chiroptical responses.

----- Lunch 12:00-13:30 -----

Oral, Thursday, 24 April AM

OPTM <Room 213>

[OPTMp]

Poster session program p.144

OWPT <Room 416+417>

OWPT7-02 11:30

Fill Factor Improvement on Photovoltaic Device with Thick Electrode under High Intensity Laser Irradiation

Kotona Tabata[1], Takaya Oshimo[1], Takeru Yamada[1], Junichi Suzuki[2], Reo Aoyama[2], Shiro Uchida[2], Kouichi Akahane[3], Yukiko Suzuki[4], Natsuha Ochiai[4], Kazuto Kashiwakura[4], Sho Aonuki[4], Youhei Toriumi[4], Madoka Takahashi[4], Kensuke Nishioka[1], Masakazu Arai[1]
[1]University of Miyazaki, [2]Chiba Institute of Technology, [3]National Institute of Information and Communications Technology, [4]NTT Space Environment and Energy Laboratories

The current density-voltage characteristics of InGaAsP solar cell devices with thick electrode using electrolytic gold plating were investigated. Power conversion efficiency of 31.5% was achieved under 940 nm laser irradiation in a 1cm squared device.

OWPT7-03 11:45

Investigation of Conversion Efficiency of Series-arranged CIGS Solar Cells Irradiated with Multi-beam Laser

Riku Maeno[1], Kyosuke Sato[1], Shuntaro Fujii[1], Moeka Chiba[1], Hironori Komaki[2], Hiroaki Nakamura[2], Hiroshi Tomita[2], Yusuke Oda[2], Takato Ishiuchi[2], Shiro Uchida[1]
[1]Chiba Institute of Technology, [2]Idemitsu Kosan Co., Ltd.

We studied the dependence of multi-beam laser irradiation position on CIGS solar cells. The allowable margin for suppressing the decrease in conversion efficiency to within 20% was expanded from ±1mm to ±3mm using two beams.

----- Lunch 12:00-13:30 -----

TILA-LIC <Room 315>

----- Lunch 12:00-13:30 -----

XOPT <Room 313+314>

[XOPT8] 11:20-11:50
Optics (III)
Chair: Yuya Kubota
RIKEN SPring-8 Center

XOPT8-01 11:20

Development of an etching technique using atmospheric pressure plasma to realize a distortion-free Ge channel-cut crystal monochromator

Masafumi Miyake[1], Shotaro Matsumura[1], Iori Ogasahara[1], Taito Osaka[2], Jumpei Yamada[1], Daisetsu Toh[1], Kazuto Yamauchi[3], Makina Yabashi[2,4], Yasuhisa Sano[1]
[1]Graduate School of Engineering, Osaka University, [2]RIKEN SPring-8 Center, [3]Osaka University-RIKEN Center for Science and Technology, Osaka University, [4]Japan Synchrotron Radiation Research Institute

We applied an etching technique using atmospheric pressure plasma to germanium channel-cut crystal monochromators. As a result, sub-surface crystal damage was successfully removed and a distortion-free Ge CCM was realized.

XOPT8-02 11:35

Key Aspects of Sub-Nanometer Ion Beam Figuring for Synchrotron Hard X-Ray Mirror Fabrication

Tianyi Wang, Lei Huang, Yi Zhu, Corey Austin, Mourad Idir
Brookhaven National Laboratory

Sub-nanometer precision in X-ray mirror fabrication is achieved using ion beam figuring with advanced metrology, optimized dwell time, and precise velocity scheduling at NSLS-II. These innovations enable superior optical components for synchrotron applications across the DOE complex in the US.

----- Lunch 11:50-13:20 -----

NOTE

Oral, Thursday, 24 April PM

ALPS <Room 303>

[ALPS-I5] 13:45-15:15
Optical frequency combs / Frequency stabilized lasers and applications (5)
Chair: Mamoru Endo
Tokyo Univ.

ALPS-I5-01 13:45 *Invited*

Three-Dimensional Imaging Using Optical Frequency Combs
Stephan Amann[1,2], Edoardo Vicentini[2,3], Theodor Wolfgang Hänsch[2], Nathalie Picqué[1,2]
[1]Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy, [2]Max Planck Institute of Quantum Optics, [3]CIC nanoGUNE BRTA
Frequency combs as tools for three-dimensional imaging allow to measure the surface profile of macroscopic objects with unprecedented precision.

ALPS-I5-02 14:15

Three-dimensional nm-level displacement captured by coherent linked one-shot three-dimensional imaging with optical frequency comb
Takashi Kato, Kotaro Ogura, Kaoru Minoshima
The University of Electro-Communications
For demonstrating one-shot 3D imaging method towards extremely wide dynamic range using an optical frequency comb, we captured 3D video of sub-μm-range displacement of a mirror with nm-level uncertainty.

ALPS-I5-03 14:30

Sensitivity-Enhanced Refractive-Index-Sensing Optical Comb by Frequency Multiplication based on THz Comb
Masayuki Higaki[1], Shogo Miyamura[1], Shuji Taue[2], Yu Tokizane[1], Eiji Hase[1], Takeo Minamikawa[3,1], Takeshi Yasui[1]
[1]Institute of Post-LED Photonics (pLED), Tokushima University., [2]Kochi University of Technology., [3]Grad. Sch. Engg. Sci., Osaka University.
Refractive-index-sensing optical comb is capable of RF-reading high-precision refractive index (RI) measurements. To amplify the RI-dependent frequency shift, we report a method for frequency multiplication of the RF sensor signal based on THz comb.

ALPS <Room 511+512>

[ALPS-G2] 13:45-15:15
Advanced Photonic Materials and Devices
Chair: Yoshiaki Nishijima
Yokohama National University

ALPS-G2-01 13:45 *Invited*

High-throughput Analytical Methods Based on Light-induced Acceleration of Biochemical Reactions toward Quantum Biology
Takuya Iida[1,2]
[1]Department of Physics, Graduate School of Science, Osaka Metropolitan University, [2]Research Institute for Light-induced Acceleration System (RILACS), Osaka Metropolitan University
We demonstrated highly sensitive and rapid selective detection of proteins and nucleic acids based on our developed light-induced acceleration system. Our finding would provide an important platform for next generation medical testing and quantum biology.

ALPS-G2-02 14:15

Thermal radiation controlling by MIM metasurfaces
Yoshiaki Nishijima
Yokohama National University
We will demonstrate the thermal radiation controlling using metal-insulator-metal metasurfaces towards infrared optical sensors. We will discuss the how to controlling the directionality, radiation intensity, radiation linewidth and so on in the presentation.

ALPS-G2-03 14:30

Characterizing microresonators using spontaneous symmetry breaking of counter-propagating light fields
Alekhya Ghosh[1,2], Arghadeep Pal[1,2], Haochen Yan[1,2], Toby Bi[1,2], Ibrahim El Mazbouh[1,2], Shuangyou Zhang[3,1], Lewis Hill[1], Pascal Del'Haye[1,2]
[1]Max Planck Institute for the Science of Light, [2]Department of Physics, Friedrich-Alexander-Universität Erlangen-Nürnberg, [3]Department of Electrical and Photonics Engineering, Technical University of Denmark
We analyze the directionality of the scatterers in a microresonator by utilizing spontaneous symmetry breaking of counter-propagating light waves. Our work will be crucial for developping precise sensore and characterizing microresonators.

BISC <Room 419>

[BISCp] 13:30-15:00
BISC Poster Session
<Exhibition Hall A>

Poster session program p.145-

HEDS <Room 311+312>

[HEDSp] 13:30-15:00
HEDS Poster Session
<Exhibition Hall A>

Poster session program p.147

Oral, Thursday, 24 April PM

LSC <Room 421>

[LSC5] 13:50-15:25
Quantum materials
Chair: Masaki Hada
University of Tsukuba

LSC5-01 13:50 *Invited*

BCS-BEC crossover in cuprates revealed by ARPES
Takeshi Kondo
ISSP, University of Tokyo
The electronic phase diagram of cuprate superconductors has been mainly studied in materials with one or two CuO_2 planes per unit cell, where direct contact with charge reservoir layers induces disorder. In multilayered systems, inner CuO_2 planes avoid this disorder. Using ARPES, we examine the superconducting band structure of a four-layered cuprate in lightly doped, low-disorder inner planes.

LSC5-02 14:10 *Invited*

Development of a versatile micro-ARPES system at NanoTerasu
Hideaki Iwasawa
National Institutes for Quantum Science and Technology
We will present the detailed specifications and current status of a versatile system at the high-resolution ARPES branch of BL06U at NanoTerasu, Japan's newest 3-GeV synchrotron radiation facility. The endstation is designed to enable spin-resolved soft X-ray ARPES (SX-SARPES) with micro-scale spatial resolution.

LSC5-03 14:30 *Invited*

Observation of chiral phonons induced by helical antiferromagnetic spins via RIXS
Jun Okamoto[1], Chung-Yu Mou[2], Hsiao-Yu Huang[1], Ganesha Channagowdra[1], C. J. Won[3], Kai Du[4], X. C. Fang[4], Sang-Wook Cheong[4], E. Komleva[5,6], Sergey Streltsov[5,6], Chien-Te Chen[1], Atsushi Fujimori[1,2,7], Di-Jing Huang[1,8,9]
[1]National Synchrotron Radiation Research Center, Taiwan, [2]Center for Quantum Science and Technology and Department of Physics, National Tsing Hua University, Taiwan, [3]Max Planck POSTECH/Korea Research Initiative, Korea, [4]Rutgers Center for Emergent Materials and Department of Physics and Astronomy, Rutgers University, USA, [5]Institute of Metal Physics, Russia, [6]Department of Theoretical Physics and Applied Mathematics, Ural Federal University, Russia, [7]Department of Physics, The University of Tokyo, Japan, [8]Department of Physics, National Tsing Hua University, Taiwan, [9]Department of Electrophysics, National Yang Ming Chiao Tung University, Taiwan
Coupling of chiral phonon and magnetization is one of the hot topics in condensed matter physics. We observed giant chiral phonons induced by helical spins in a chiral-structure multiferroic Mn-doped Ni_3TeO_6 via O *K*-edge RIXS.

LSSE <Room 412>

[LSSE6] 13:00-15:10
Infrastructure
Chairs: Noboru Hasegawa
QST
Akihiko Nishimura
JAEA

LSSE6-01 13:00 *Invited*

Low-Power Frequency Monitoring System for Infrastructure Using MEMS Vibrational-Energy Harvesting Sensor
Hiroyuki Mitsuya[1], Katsufumi Hashimoto[2], Hisayuki Ashizawa[1], Takuma Ishiguro[1], Masakazu Sako[3], Satoshi Tomoto[4], Gen Hashiguchi[5], Hiroshi Toshiyoshi[6], Tomoki Shiotani[7]
[1]SAGINOMIYA SEISAKUSHO, INC., [2]Hokkaido university, [3]Koken Engineering Co., Ltd., [4]CTI Engineering Co., Ltd., [5]Shizuoka University, [6]The University of Tokyo, [7]Kyoto University
We have developed a low-power sensor utilizing a MEMS vibrational energy harvester for infrastructure monitoring. This sensor, which generates significant output power within a narrow frequency band of approximately 1 Hz, can greatly reduce inspection time by instantly identifying the natural frequencies depending upon the condition of various infrastructures.

LSSE6-02 13:30 *Invited*

Development of Double-pulse LIBS Technique for Concrete Infrastructure Assessment
Shinri Kurahashi, Toshihiro Somekawa
Institute for Laser Technology
For salt damage assessment of concrete infrastructure such as bridges, a remote doublepulse LIBS system was developed. We constructed the system with coaxial signal transmission and receiving, the LIBS spectrum was successfully acquired from a sample placed 3 meters away.

LSSE6-03 14:00 *Invited*

Efficiency Improvement of Inspection Work Using Damage Level Evaluation of Concrete Delamination and Internal Defects Evaluated by a Laser Remote Sensing System
Hikaru Matsunaga[1], Satoshi Satoshi Tomoto[1], Noboru Hasegawa[2], Kako Takashi[3], Hikaru Nakamura[3]
[1]CTI Engineering Co. Ltd, [2]National Institutes for Quantum Science and Technology, [3]Nagoya Univercity
Laser Hammering System cannot complete inspections alone. This study examines incorporating it as a screening tool into conventional inspection to reduce labor. Automation improves efficiency, but conveying inspection areas to inspectors remains challenging in tunnels.

LSSE6-04 14:30

Development of small laser hammering system for inspections of concrete infrastructures
Noboru Hasegawa[1], Hajime Okada[1], Shuji Kondo[1], Masaharu Nishikino[1], Katsuya Sakamoto[2], Masaru Kabashima[2], Shinri Kurahashi[4], Toshihiro Somekawa[4], Satoshi Tomoto[3], Hikaru Nakamura[5]
[1]QST, [2]Photon-Labo. Co., Ltd., [3]CTI Engineering Co., Ltd., [4]Institute for Laser Technology, [5]Nagoya University
Laser hammering system (LHS) is non-destructive remote sensing device, for concrete infrastructures. Development of small device for digitalization and prediction of concrete soundness are in progress to achieve smart infra-maintenance.

META <Room 411>

[META7] 13:30-15:00
Session 7
Chairs: Takuo Tanemura
The University of Tokyo
Takuo Tanaka
RIKEN
Din-Ping Tsai
City University of Hong Kong

META7-01 13:30 *Invited*

Metasurface for thin-film and surface metrology
Yuanmu Yang
Tsinghua University
We demonstrate that metasurfaces can enable miniaturized instruments for precision metrology of thin film thickness, refractive index, and surface morphology.

META7-02 14:00

Area Dependence of Subwavelength Gratings for Wide-Angle Deflection of Terahertz Waves
Kohei Chiba, Yoshiaki Kanamori
Tohoku University
Subwavelength gratings are designed to match diffraction and refraction angles, but in wide-angle deflection, smaller element areas reduce diffraction and alter refraction angles, causing deflection angles to deviate from the design values.

META7-03 14:15

Model-based deep learning for metasurface holography
Yunhui Gao, Kexuan Liu, Jiachen Wu, Liangcai Cao
Tsinghua University
In this talk, we present a general inverse problem-solving framework for metasurface holography, with an emphasis on model-based deep learning approach for high-speed and high-quality hologram generation.

META7-04 14:30

Meta-imagers with high-parallel feature extraction for neural network accelerator
Danlin Xu, Liangcai Cao
Department of Precision Instruments Tsinghua University
We propose an ultra-compact meta-imager with high-parallel feature extraction designed to accelerate neural network computing and enhance energy efficiency. This approach holds significant potential for a wide range of intelligent sensing applications, including autonomous driving, biomedicine, and object recognition.

OMC <Room 418>

[OMCp] 13:30-15:00
OMC Poster Session
<Exhibition Hall A>

Poster session program p.148

Oral, Thursday, 24 April PM

OWPT <Room 416+417>

[OWPTp] 13:30-15:00
OWPT Poster Session
<Exhibition Hall A>

Poster session program p.148

TILA-LIC <Room 315>

[TILA-LIC6] 13:30-15:00
High power laser sources
Chair: Vincent Yahia
RIKEN SPring-8 Center, Japan

TILA-LIC6-01 13:30 ***Invited***

Femtosecond thin-disk laser platform Perla and its applications in multi-beam micromachining

Martin Smrz[1], Petr Hauschwitz[1], Michal Chyla[1], Jiri Muzik[1], Pawel Sikocinski[1], Kohei Hashimoto[1], Jan Brajer[1], Antonin Fajstavr[2], Sabina Kudelkova[2], Tomas Mocek[1]
[1]HiLASE centre, Institute of Physics ASCR, Za Radnici 828, 252 41 Dolni Brezany, Czechia, [2]Crytur spol. s r.o., Na Lukach 2283, 511 01 Turnov, Czechia

Femtosecond lasers are an ideal tool for creation of laser-induced periodic surface structures. We report on the latest results in multi-beam approach to parallelization and increase in manufacturing speed of the microstructures. We also present our results in development of kW-level thin-disk-based micromachining station for optimization of the LIPSS processes.

TILA-LIC6-02 14:00

Progress on LED pumped laser with megawatt peak power

Chun-Yu Cho
Department of Electro Optical Engineering, National United University

We reported the recent progress on the LED direct pumped laser with megawatt peak power. The laser performance can be verified by applying frequency conversion from green (SHG) to eye-safe (OPO) outputs.

TILA-LIC6-03 14:15

Characterization of electro-optically controlled pulse stacking of 2x64 pulses

Yizhou Liu[4,5], Yufeng Wu[1,2], Bowei Yang[1], Ruoao Yang[1], Zhe Lin[1,3], Xing Chen[3], Yanrong Song[2], Zhigang Zhang[1]
[1]State Key Laboratory of Advanced Optical Communication Systems and Networks, School of Electronics, Peking University, [2]School of Physics and Optoelectronic Engineering, Beijing University of Technology, [3]State Key Laboratory of Information Photonics and Optical Communications, Beijing University of Posts and Telecommunications, [4]School of Information Science and Engineering, and Shandong Provincial Key Laboratory of Laser Technology and Application, Shandong University, [5]Key Laboratory of Laser & Infrared System Ministry of Education, Shandong University

We investigated an electro-optically controlled pulse stacking system in which 2x64 femtosecond laser pulses combined. By balancing the intensity and nonlinear phase in the burst pulse train, the combined pulse can be compressed to 255 fs.

XOPT <Room 313+314>

[XOPT9] 13:20-14:35
Optics (IV)
Chair: Aymeric Robert
MAX IV Laboratory

XOPT9-01 13:20 ***Invited***

Exploring the interaction between X-ray wave and optical elements: a physical optics perspective

Lorenzo Raimondi
Advanced Light Source LBNL, Berkeley CA, USA

This study examines X-ray wave interactions with optical components, analyzing PSD-related wavefront distortions. Results improve optical design, addressing scattering, diffraction, and aberrations for enhanced performance in synchrotron and FEL applications.

XOPT9-02 13:50

Measurements of Source Emittance and Beam Coherence Properties of the Upgraded APS

Xianbo Shi[1], Yu-Chung Lin[1], Jiyong Zhao[1], Thomas Toellner[1], Michael Hu[1], Soenke Seifert[1], Byeongdu Lee[1], Walan Grizolli[2], Michael Wojcik[1], Luca Rebuffi[1], Lahsen Assoufid[1], Vadim Sajaev[1]
[1]Argonne National Laboratory, [2]Lawrence Berkeley National Laboratory

We present source emittance and beam coherence measurements of the upgraded APS using grating interferometry, establishing benchmarks for low-emittance synchrotron sources and providing baseline data for beamline performance and future enhancements.

XOPT9-03 14:05

Annular refractive x-ray lenses

Felix Wittwer[1,2], Peter Modregger[1,2]
[1]University of Siegen, [2]Deutsches Elektronen-Synchrotron

Annular lenses remove the central part from the lens aperture, which allows to make thinner lenses with less absorption, smaller focal spots and higher resolution than conventional full aperture lenses.

XOPT9-04 14:20

Bragg reflection X-ray polarimeter based on a bent silicon crystal using hot plastic deformation

Daiki Ishi[1], Aoi Ishimure[2], Yuichiro Ezoe[2], Kumi Ishikawa[2], Masaki Numazawa[2], Hiromi Morishita[2], Rei Ishikawa[2], Daiki Morimoto[2], Yudai Yamada[2], Shunei Miyauchi[2], Yuto Ogasawara[2], Naoya Sera[2], Haruka Nakagawa[2], Yu Fukushima[2], Kazuhisa Mitsuda[3], Kohei Morishita[4], Kazuo Nakajima[5]
[1]Institute of Space and Astronautical Science, Japan Aerospace Exploration Agency, [2]Department of Physics, Tokyo Metropolitan University, [3]International Center for Quantum-field Measurement Systems for Studies of the Universe and Particles, Inter-University Research Institute Corporation High Energy Accelerator Research Organization, [4]Faculty of Engineering, Kyushu University, [5]Institute for Materials Research, Tohoku University

We have been developing a novel Bragg reflection X-ray polarimeter using hot plastic deformation of silicon wafers. To demonstrate X-ray focusing and spectroscopy, we irradiated a spherically deformed silicon wafer with Fe $K_{\alpha}1$ and $K_{\alpha}2$ lines using the ISAS/JAXA 30 m beam line. Bragg reflection images captured with an X-ray CMOS camera confirmed a focal position consistent with the design. An off-focus spectral resolution of 2.7 eV (FWHM) for the Fe K_{α} lines was achieved.

NOTE

Oral, Thursday, 24 April PM

ALPS <Room 303>

ALPS-I5-04 14:45

High-Precision Absolute Distance Measurement Method with f_{ceo} tuning in Adaptively Controlled Optical Frequency Comb Interferometry

Kei Urano, Kanyo Akuzakawa, Takashi Kato, Kaoru Minoshima
The University of Electro-Communications

Carrier-envelope-offset frequency tuning of an optical frequency comb was realized by adaptively controlling pulse envelope to environmental fluctuations, enabling a 61 m absolute distance measurement.

ALPS-I5-05 15:00

High-precision 3D optical profilometry of non-cooperative targets using electro-optic dual-comb technology

Ziling Wu
Tianjin University

We introduce a three-dimensional surface profilometry system with micrometer-level precision at a 100-mm stand-off distance for non-cooperative targets, employing an electro-optic dual-comb in conjunction with time-domain coherent averaging.

----- Coffee Break 15:15-15:30 -----

[ALPS-I6] 15:30-17:00
Optical frequency combs / Frequency stabilized lasers and applications (6)
Chair: Guanhao Wu
Tsinghua University

ALPS-I6-01 15:30 ***Invited***

Adaptive Dual-Comb Spectroscopy Platform for Customized Step-Scan and Apodized Sampling Patterns

Esther Baumann
NIST

We present a free-form dual-comb spectrometer. The measurement update rate and signal to noise ratio can be tailored to a sample by programming appropriate sampling patterns.

ALPS-I6-02 16:00

Time-Resolved Photon-Counting Time-of-Flight Ranging Technique by Asynchronous Optical Sampling Using a Dual-Wavelength Comb

Hajime Komori[1], Prasad Koviri[1], Thomas R Schibli[2], Takashi Kato[1,3], Akifumi Asahara[1,3], Ryosuke Shimizu[1,3], Kaoru Minoshima[1,3]
[1]Graduate School of Informatics and Engineering, The University of Electro-Communications, [2]University of Colorado Boulder, [3]Institute for Advanced Science, The University of Electro-Communications

We developed an asynchronous optical sampling technique to realize photon-counting time-of-flight ranging using a dual-wavelength comb. The sample thickness was measured with sub-micrometer accuracy and ultra-high sensitivity at the single-photon level.

ALPS <Room 511+512>

ALPS-G2-04 14:45

Interpreting Purcell Effect on Resonant Metasurfaces with Spectral Parameters

Joshua T. Y. Tse, Taisuke Enomoto, Shunsuke Murai, Katsuhisa Tanaka
Kyoto University

We propose a new analytical method that predicts the Purcell enhancement mediated by a metasurface coupled with a photoluminescence thin film. We verified the model and analyzed the photoluminescence with different resonant metasurfaces.

ALPS-G2-05 15:00

Fluorescence Enhancement and Directionality Control Using TiO_2 Nanoantenna Sticker

Hongjie Gao, Shunsuke Murai, Katsuhisa Tanaka
Kyoto University

Directional emission is vital for next-generation solid-state-lighting. Flexible nanoantenna stickers integrated with YAG:Ce phosphors and DBRs enhance fluorescence directionality, achieving improved emission efficiency and advancing the development of compact, high-performance illumination technologies.

----- Coffee Break 15:15-15:30 -----

[ALPS-G3] 15:30-17:00
Metasurfaces for Imaging and Sensing
Chair: Koichi Okamoto
Osaka Metropolitan University

ALPS-G3-01 15:30 ***Invited***

Substrate based colorimetric biosensors using plasmonic metasurface

Mana Toma
Institute of Science Tokyo

Direct detection of biomolecules including cancer marker and food allergen are demonstrated by using substrate -based colorimetric plasmonic biosensors, which is potentially applied for portable biosensors.

ALPS-G3-02 16:00

Development of Varifocal Alvarez Metalens Using High-Order Polynomials

Isshu Shirota, Tamaki Onozawa, Kentaro Iwami
Tokyo University of Agriculture and Technology

We fabricated Alvarez metalens with a higher-order polynomial to improve the light collection performance at the working wavelength of 940 nm.

BISC <Room 419>

[BISCp]

Poster session program p.145-

----- Coffee Break 15:00-15:15 -----

[BISC5] 15:15-17:00
Spectroscopic Imaging and Optical Biopsy
Chair: Tom Vettenburg
University of Dundee

BISC5-01 15:15 ***Invited***

Advanced molecular imaging and sensing with biocompatible and highly sensitive Raman spectroscopy

Takeo Minamikawa
Osaka University, Japan

Remote plasmonic-enhanced Raman spectroscopy with biocompatibility and molecular sensitivity above nM has been demonstrated, highlighting its potential for bioimaging applications with high sensitivity and specificity.

BISC5-02 15:45 ***Invited***

Biomarker for Retinopathy by Hyperspectral Ophthalmoscope Images

Hsiang-Chen Wang
National Chung Cheng University, Taiwan

This study investigates the potential of hyperspectral imaging (HSI) to detect Dementia, Age-related Macular Degeneration, Hydroxychloroquine retinopathy, Glaucoma, and Diabetic retinopathy by analyzing retinal changes associated with blood vessel and surrounding areas spectral information. Combining artificial intelligence and hyperspectral imaging technology brings new insights into retinopathy.

HEDS <Room 311+312>

[HEDSp]

Poster session program p.147

Oral, Thursday, 24 April PM

LSC <Room 421>

LSC5-04 14:50 *Invited*

Ultra-high efficiency of soft x-ray angle-resolved photoemission spectroscopy with unsupervised deep learning

Kohei Yamagami
Japan Synchrotron Radiation Research Institute

We develop the removing noise system by using the unsupervised deep learning and install to the micro focused SX-ARPES system at SPring-8 BL25SU. Our denoising system successfully reduce the time burden in SX-ARPES and ehance the expectation about the advance toward the lower photoelectron yield measurements such as a three-dimensional nonequilibrium measurement.

LSC5-05 15:10

Millisecond to Femtosecond Pump-Probe Time-Resolved X-ray Diffraction/Scattering Experiments at the MAX IV Laboratory

Byungnam Ahn
MAX IV Laboratory

The 4th generation storage ring-based and linac-based synchrotron X-ray sources have enabled pump-probe time-resolved X-ray experiments on millisecond to femtosecond timescales[1,2,3]. We present the recent developments, applications, and opportunities of the experiments at the CoSAXS4 and FemtoMAX5 beamline at the MAX IV Laboratory.

----- Coffee Break 15:25-15:55 -----

[LSC6] 15:55-17:15
New techniques and theory (1)
Chair: Hideaki Iwasawa
National Institutes for Quantum Science and Technology

LSC6-01 15:55 *Invited*

Development of ultrashort pulse laser sources for integration with synchrotron radiation

Keisuke Kaneshima, Yoshihito Tanaka
University of Hyogo

We developed a compact femtosecond fiber laser system synchronizable with synchrotron X-ray pulses. This cost-effective and portable system outputs 4.5 nJ, 35 fs pulses and enables efficient, flexible time-resolved spectroscopy in synchrotron facilities.

LSSE <Room 412>

LSSE6-05 14:50

Nondestructive Testing for Concrete Structures using Picosecond and Femtosecond Pulse Lasers

Kento Kuwata[1], Sei Ukai[1], Kakeru Yugami[1], Masaharu Nishikino[2], Noboru Hasegawa[2], Naoki Hosoya[1]
[1]Shibaura Institute of Technology, [2]Kansai Institute for Photon Science, National Institutes for Quantum Science and Technology

Laser-induced plasma shock waves might be used for inspection of concrete wall. However, large sound noise generated by nano-second pulsed laser makes it difficult. We tried to reduce sound noise by using shorter pulsed laser.

----- Coffee Break 15:10-15:30 -----

[LSSE7] 15:30-17:20
Industrial Application
Chairs: Akihiko Nishimura
JAEA
Noboru Hasegawa
QST

LSSE7-01 15:30 *Invited*

Sweep pulse excitation scheme toward low-average-power laser hammering inspection

Katsuhiro Mikami
Kindai University

Sweep pulse excitation using low-average-power laser is one of the laser hammering schemes. This method provides convenience, safety, and cost reduction in fields of medical diagnostics and industrial and so on.

LSSE7-02 16:00 *Invited*

The Laser Cleaning and Decontamination Facilities

Eisuke John Minehara
LDD Corporation

The current operational status of the LDDC's multi-kW class high power density, high scanning speed, single mode fiber laser cleaning and decontamination facilities will be reported to targets with large amounts of radioisotope (RI) contaminants around and outside the TEPCO Fukushima Daiichi Nuclear Power Plant.

META <Room 411>

META7-05 14:45

Multi-channel and Fully-crosstalk-free Holographic Display enabled by a Spin and Angle Co-multiplexed Metahologram

Cheng Zhang
Huazhong University of Science and Technology

We present a novel design of a spin and angle co-multiplexed metahologram, which operates based on the k-space translation strategy and enables six-channel, fully-crosstalk-free holographic displays over the whole visible region.

----- Coffee Break 15:00-15:30 -----

[META8] 15:30-16:45
Session 8
Chairs: Yuanmu Yang
Tsinghua University
Takuo Tanaka
RIKEN
Din-Ping Tsai
City University of Hong Kong

META8-01 15:30

Metasurfaces for Imaging, Sensing and Display

Junsuk Rho
POSTECH

Applications of metasurfaces from microscopes to 3D sensors, LiDAR, bio-imaging, and cameras, covering UV to infrared wavelengths. Despite their potential, commercialization has been hindered by high costs and low throughput. To address these issues, we have explored nanoimprint lithography with high-refractive-index particles, ArF photolithography for large-area production, and wafer-scale nanoimprint technology.

META8-02 16:00

Design of Plasmonic Gratings on Silicon Image Sensor for Near-Infrared Sensitivity Enhancement with Wide Incident Angles

Koya Okazaki[1], Takahito Yoshinaga[1], Nobukazu Teranishi[2], Atsushi Ono[1,2]
[1]Graduate School of Integrated Science and Technology, Shizuoka University, [2]Research Institute of Electronics, Shizuoka University

We proposed silicon image sensors with plasmonic gratings for near-infrared sensitivity enhancement. Photon confinement within the silicon layer under quasi-surface plasmon resonance conditions significantly increased silicon absorption efficiency by 10 times at 940 nm wavelength.

OMC <Room 418>

[OMCp]

Poster session program p.148

[OMC9] 15:00-17:00
Session 7
Chair: Une Butaite
University of Exeter

OMC9-01 15:00 *Invited*

Optical nanofibers - a powerful tool for manipulating and trapping cold atoms and microparticles

Sile Nic Chormaic
OIST Graduate University

The optical nanofiber, while remarkably simple in design, yields surprisingly beautiful complexity. In this work, we will explore recent advances in the use of optical nanofibers, from manipulating particles to generating one-dimensional arrays of cold ground state or Rydberg atoms. Some of the challenges and potentials they provide in both classical and quantum physics are also discussed.

OMC9-02 15:30 *Invited*

Advancing Circularly Polarized Lasers: Integration of Nonreciprocal Chiral Thin Films for Enhanced DOCP and Dissymmetry Factors

Tzu-Ling Chen[1], Li-Zhi Lin[1], Ling-Qi Huang[1], Shi-Wei You[1], Francesco Zinna[2], Andrew Salij[3], Lorenzo Di Bari[2], Randall Goldsmith[4], Roel Tempelaar[3], Chia-Yen Huang[1]
[1]National Yang Ming Chiao Tung University, Taiwan, [2]Università di Pisa, Italy, [3]Northwestern University, USA, [4]University of Wisconsin-Madison, USA

Nonreciprocal organic thin films exhibiting Apparent Circular Dichroism (ACD) enable direct circularly polarized (CP) laser emission with a record DOCP of 0.6 (g_{lum}=1.2) in a dye laser cavity, advancing chiral photonic device technology.

OMC9-03 16:00

Microrheology of the Cumulus-Oocyte Matrix using Optical Tweezers

Carl A. Campugan[1,4], Chris Perrella[2], Megan Lim[1], Tiffany C.Y. Tan[1], Eric P. Schartner[2], Yoshihiko Arita[3], Graham Bruce[3], Tania Mendonca[4], Amanda J. Wright[4], Kishan Dholakia[2,3], Kylie Renee Dunning[1]
[1]Centre of Light for Life & The Robinson Research Institute, School of Biomedicine, University of Adelaide, Adelaide, SA, Australia, [2]Centre of Light for Life & Institute for Photonics and Advanced Sensing & School of Biological Sciences, University of Adelaide, Adelaide, SA, Australia, [3]SUPA, School of Physics & Astronomy, University of St Andrews, North Haugh, St Andrews KY16 9SS, UK, [4]Optics and Photonics Research Group, Faculty of Engineering, University of Nottingham, Nottingham, NG7 2RD, UK

Optical tweezers offers a powerful, versatile approach for microrheology measurements. We demonstrate the application of optical tweezers to measure the viscosity of the extracellular matrix surrounding mammalian oocytes and discuss its future as a marker for oocyte quality.

Oral, Thursday, 24 April PM

OWPT <Room 416+417>

[OWPTp]

Poster session program p.148

TILA-LIC <Room 315>

TILA-LIC6-04 14:30

Repetition rate tunable femtosecond solid-state fiber laser

Ruoao Yang[1], Xingang Jin[2], Xinpeng Lin[2], Aimin Wang[1], Zhigang Zhang[1]
[1]Peking University, [2]Jiaxing Xurui Electronics Tech Co Ltd

We present a tunable repetition rate femtosecond "solid-state fiber" laser with a ceramic substrate, offering a tunability range of over 30 MHz, sub-100 fs pulse width, and 500 mW output power. This laser is ideal for high-performance applications like dual-comb spectroscopy, time-frequency metrology, and high-resolution ranging.

TILA-LIC6-05 14:45

Evaluation of high power 3-μm and 4-μm mid-infrared lasers

Linpeng Yu[1], Daiki Okazaki[2], Shigeki Tokita[2], Hiyori Uehara[1], Ryo Yasuhara[1]
[1]National Institute for Fusion Science, [2]Kyoto University

Mid-infrared laser sources operating in the spectral range of 3–5 μm are of vast importance because of their wide scientific and industrial applications. This presentation will show our recent efforts in devloping high power mid-infrared lasers.

----- Coffee Break 15:00-15:30 -----

[TILA-LIC7] 15:30-17:00
Printing & bonding
Chair: Hideho Odaka
RIKEN SPring-8 Center, Japan

TILA-LIC7-01 15:30 ***Invited***

Tiny integrated nanolaser innovations through transfer printing techniques

Myung-Ki Kim
Korea University, Korea

This presentation explores the integration of ultra-compact nanolasers using advanced transfer printing techniques. We highlight the potential of efficient, low-power, ultra-miniaturized lasers based on silicon photonics and demonstrate how transfer printing overcomes challenges in design, alignment, and high-density integration for nanolaser implementation.

XOPT <Room 313+314>

----- Coffee Break 14:35-15:00 -----

[XOPT10] 15:00-15:45
Imaging (IV)
Chair: Takashi Kimura
The University of Tokyo

XOPT10-01 15:00

Tilting X-ray Ptychography

Mikhail Lyubomirskiy[1], Tang Li[2], Ken Vidar Falch[2], Jan Garrevoet[2], Leonid Dubrovinsky[3]
[1]Lund University, MAX IV Laboratory, [2]DESY photon science, [3]Bayerisches Geoinstitut

In our work, we have accomplished a breakthrough in in-situ phase contrast X-ray imaging. The oxidation of Fe under a pressure of 51 GPa was visualized with X-ray ptychography by tilting a focused X-ray beam.

XOPT10-02 15:15

The new Coherent Diffraction Imaging beamline at Elettra 2.0

Roberta Totani[1], Claudio Mazzoli[2], Oleg Chubar[2], Joseph Dvorak[2], Steven Hulbert[2], Matteo Pancaldi[1], Matteo Altissimo[1], Edoardo Busetto[1], Lorenzo Raimondi[1]
[1]Elettra Sincrotrone Trieste S.C.p.A., [2]Brookhaven National Laboratory, National Synchrotron Light Source II

CDI, a new beamline for Coherent Diffraction Imaging, will be realized for Elettra 2.0, the upgrade of the Italian synchrotron facility. We will explain how CDI optical layout allows to preserve the enhanced coherence of the new source and to compensate possible optical aberrations. Moreover, we will show partially coherent wavefront propagation simulations to highlight the remarkable CDI experimental potentialities and versatility.

XOPT10-03 15:30

***Operando* X-ray Absorption Microscopy to Measure Concentration Profiles in Battery Electrolytes**

Emil Jan Skrentny[1,2], Marten Huck[1,2], Andreas Kuhlmann[1,2], Artem Saleev[1], Ferit Sit[1,2], Steffen Tober[1], Fabian Wilde[3], Hans-Georg Steinrück[1,2]
[1]Forschungszentrum Jülich GmbH, Institute for a Sustainable Hydrogen Economy (INW), [2]RWTH Aachen University, Institute of Physical Chemistry, [3]Helmholtz-Zentrum Hereon

We developed a novel X-ray microscopy setup to *operando* and directly measure concentration profiles in polarized electrochemical cells. With our methodology, we aim to support knowledge-based electrolyte optimization by efficient determination of electrolyte transport parameters.

NOTE

Oral, Thursday, 24 April PM

ALPS <Room 303>

ALPS-I6-03 16:15

Resolution-Enhanced FMCW LiDAR System Utilizing Chip-Scale Dual Electro-Optic Combs

Weiwei Yang, Xingyu Jia, Junzhe Qiang, Yang Li, Guanhao Wu
Tsinghua University

The sweep bandwidth of a DFB laser is expanded by employing electro-optic combs with slightly different repetition frequencies. With the real time nonlinear calibration method, it can realize a high-resolution and high-accuracy FMCW LiDAR system.

ALPS-I6-04 16:30

Sensitivity improvement of dual-comb spectroscopy using spectral peaking.

Kyosuke Kato[1], Ryuichiro Usui[1], Syotaro Kitajima[1], Ryohei Terabayashi[1], Hideki Tomita[1], Hisashi Abe[2], Norihiko Nishizawa[1]
[1]Nagoya University, [2]National Institute of Advanced Industrial Science and Technology (AIST)

Pedestal-suppressed spectral peak is useful for improvement of sensitivity of dual-comb spectroscopy. We achieved high SNR of 38dB and dynamic range of 50dB for comb mode resolved CH4 absorption measurement.

ALPS-I6-05 16:45

Development of multi-component gas temperature measurement method using dual comb spectroscopy

Naoki Takeshi[1], Ryusei Uchiyama[1], Kousuke Kubota[1], Takumi Takahoshi[1], Yohei Sugiyama[2], Feng-Lei Hong[2], Yoshiaki Nakajima[1]
[1]Toho University, [2]Yokohama National University

A new gas temperature determination method using multi-component spectroscopy was developed, proving gas species independence and applicability to 12C2H2 and H13CN with Integration Log RDT.

ALPS <Room 511+512>

ALPS-G3-03 16:15

Compact Vapor Cells with Metasurfaces for Microfabricated Atomic Clocks

Yuto Kataoka[1], Ponrapee Prutphongs[1], Motoaki Hara[2], Kentaro Iwami[1]
[1]Tokyo University of Agriculture and Technology, [2]National Institute of Information and Communications Technology

In this study, a compact vapor cell with metasurfaces was fabricated. The metasurface achieved relative diffraction efficiency of 86.7%, DoCP of -0.991 and the vapor cell achieved light yield of 17.5%.

ALPS-G3-04 16:30

Wavelength-multiplexed multi-color 3D silicon nitride metasurface hologram utilizing prism phases with a triangular arrangement

Tetsuhito Omori, Junpei Beppu, Masakazu Yamaguchi, Tamaki Onozawa, Kentaro Iwami
Tokyo University of Agriculture and Technology

We propose a multicolor 3D metasurface hologram that controls crosstalk images by adding prism phases to the phase distributions of the object light in a triangular configuration to reconstruct an image.

ALPS-G3-05 16:45

Multi-eyes meta-devices imaging and sensing systems

Mu Ku Chen[1], Xiaoyuan Liu[1], Yin Zhou[1], Jialuo Cheng[1], Zhendong Luo[1], Zihan Geng[2], Takuo Tanaka[3]
[1]City University of Hong Kong, [2]Tsinghua University, [3]RIKEN Center for Advanced Photonics

We demonstrate the single, binocular, and arrayed meta-lens for developing intelligent imaging and sensing systems. It opens up an avenue for future applications in micro-robotic vision, unmanned-vehicle sensing, and miniature personal communication systems.

BISC <Room 419>

BISC5-03 16:15

High-throughput cellular imaging with reduced out-of-focus background in multiline illumination Raman microscopy

Tomoaki Okumura[1], Yasuaki Kumamoto[1,2], Katsumasa Fujita[1,2,3]
[1]Osaka University, [2]Institute for Open and Transdisciplinary Research Initiatives, [3]AIST-Osaka University Advanced Photonics and Biosensing Open Innovation Laboratory, National Institute of Advanced Industrial Science and Technology

We improved the Raman hyperspectral imaging throughput by reducing the background signals from an out-of-focus regions in multi line-illumination Raman microscopy. Additionally, time-lapse imaging of cell activity was performed to demonstrate the high-speed imaging.

BISC5-04 16:30 ***Invited***

Optics and Photonics4life: In-vivo fast screening and diagnosis of oral cancer using non-invasive optical multimodal and multispectral techniques assisted with AI and ML: Towards real-time optical biopsy

Dalip Singh Mehta[1], Veena Singh[1], Pramila Thapa[1], Shubham Tiwari[1], Vaibhav Burathoki[1], Varun Surya[2], Deepika Mishra[2]
[1]Indian Institute of Technology Delhi, India, [2]All India Institute of Medical Sciences New Delhi, India

We report fast screening and diagnosis of oral cancer patients *in vivo* using field-portable multi-modal and multi-spectral optical techniques non-invasively. Optical spectroscopic and imaging data are analyzed using AI/ML algorithms leading to real-time optical biopsy.

Oral, Thursday, 24 April PM

LSC <Room 421>

LSC6-02 16:15 *Invited*

Micro-crystal X-ray structure analysis using noise reduction by TV regularization

Kouhei Ichiyanagi
Japan Synchrotron Radiation Research Institute

A denoising method based on a total variation regularization was applied to X-ray diffraction images in X-ray crystallography, significantly improving the signal-to-noise ratio of weak diffraction spots. The denosing image processing method can offer a practical solution to improve the data quality of X-ray crystallography of micro crystals with weak diffraction intensity and protein crystals that are highly susceptible to damage by X-ray irradiation.

LSC6-03 16:35 *Invited*

Ultrafast picosecond ultraviolet luminescence of undoped zinc oxide films

Marilou Cadatal Raduban[1,2], Kota Hibino[3], Yuki Maruyama[3], Michal Kohout[4], Kohei Yamanoi[2], Nobuhiko Sarukura[2,5], Zdeněk Hubička[4], Shingo Ono[3], Jiří Olejníček[4]
[1]Unitec Institute of Technology, [2]Institute of Laser Engineering, Osaka University, [3]Nagoya Institute of Technology, [4]Institute of Physics of the Czech Academy of Sciences, [5]New Industry Creation Hatchery Center (NICHe), Tohoku University

Undoped zinc oxide (ZnO) films were deposited on soda-lime glass using Medium-Frequency magnetron sputtering with Electron-Cyclotron-Wave-Resonance plasma (MF+ECWR), achieving intense ultraviolet luminescence and ultrafast 9-ps decay times. These films offer potential for time-of-flight detectors and ultrafast timing applications.

LSC6-04 16:55 *Invited*

Research and development all solid ultraviolet laser for environmental applications

Pham Hong Minh
Institute of Physics, Vietnam Academy of Science and Technology

In this talk, I will present our results on research and development of all solid ultraviolet lasers using Cerium doped Fluoride crystal. The results of simulation and experimental studies on an ultrawide band ultraviolet solid state laser using a Ce:LiCAF crystal were also presented. These research findings open many potential applications for ultrawide-band ultraviolet lasers for environmental research.

LSSE <Room 412>

LSSE7-03 16:30 *Invited*

Experience in Measuring Environmental Radiation after the Fukushima Accident and its Legacy as Nuclear Disaster Prevention Technology

Yukihisa Sanada
JAEA

In this presentation, we will introduce new technology development that will be useful for nuclear disaster prevention in the future, based on our experience with large-scale environmental radiation monitoring at FDNPP.

LSSE7-04 17:00

Remote Strain Measurement Based on FBG Sensing for Fuel Debris Handling and its Related Applications

Akihiko Nishimura[1,2], Tsugio Ide[3], Nobuyuki Ishihara[3]
[1]JAEA, [2]Univ. of Fukui, [3]deltafiber.jp

The technologies surrounding the 1F decommissioning work are gradually forming a network with various industrial fields. Ttechnical collaboration related to remote strain measurement centered on FBG sensing developed by picosecond laser processing.

META <Room 411>

META8-03 16:15

Wafer-scale Infrared Metalens on 200 mm Si substrates through Deep-UV Lithography

Kai Sun[1], Xingzhao Yan[2], Jordan Scott[1], Jun-Yu Ou[1], Otto L. Muskens[1]
[1]Physics and Astronomy, University of Southampton, [2]Optoelectronics Research Centre, University of Southampton

We demonstrate our novel infrared silicon metalenses manufactured using the production-ready deep UV lithography technique. The metalenses were optimized for different infrared bands and with various diameter sizes from few mm to above 1 inch.

META8-04 16:30

High-Performance Ultraviolet and Visible Metasurfaces based on Tantalum Pentoxide

Zhelin Lin, Zhenyu Xing, Niu Liu, Yuhui Hu, Cheng Zhang
Huazhong University of Science and Technology

We introduce tantalum pentoxide (Ta_2O_5) as a high-refractive-index, low-optical-loss, and fabrication-friendly material platform for implementing high-performance dielectric metasurface optics over the ultraviolet and visible regions.

OMC <Room 418>

OMC9-04 16:15

Enhancement and control of spin angular momentum in plasmonic near-fields

Naoki Ichiji, Satoshi Ashihara
The University of Tokyo

Spin angular momentum (SAM) in the near field induced by rotating plasmon modes around plasmonic structures is investigated. Controlling the rotational direction of plasmon modes enables both the enhancement and directional control of SAM.

OMC9-05 16:30

Optically Driven Dynamics of Metallo-Dielectric Janus Particles Using Nanofibers

Pramitha Praveen Kamath, Souvik Sil, Viet Giang Truong, Sile Nic Chormaic
Okinawa Institute of Science and Technology

We report the optical trapping and rapid propulsion of metallodielectric Janus particles (silica spheres capped with titanium-gold) in the evanescent field of an optical nanofiber. The strong light-matter interaction confines particles radially while enabling fast, directional motion along the fiber, demonstrating a robust method for manipulating anisotropic particles.

OMC9-06 16:45

Control of Nanoparticle Rotation Direction Using Recoil Force Generated by Stimulated Emission

Yoshiki Umekawa, Takao Horai, Masaaki Ashida, Hajime Ishihara
Osaka University Graduate school of Engineering Science

The stimulated recoil force (SRF) was theorized in 2012 and confirmed experimentally in 2023. Using optical vortices, which induce material rotation, SRF is generated to control material rotation. This method can overcome thermal fluctuations, offering new possibilities for optical manipulation.

Oral, Thursday, 24 April PM

TILA-LIC <Room 315>

XOPT <Room 313+314>

[XOPT-CL] 15:45-15:50
Opening Remarks

TILA-LIC7-02 16:00

Phonon-Mediated Superconducting Particle Detectors using Surface Activated Bonding Technology for Microchip Lasers

Ryota Ito[1,2], Yuto Kamei[2], Takunori Taira[3], Hideho Odaka[3], Toru Taino[4], Satoru Mima[5], Chiko Otani[1,2]
[1]Tohoku University, [2]RIKEN, [3]IMS, [4]Saitama University, [5]NICT

We have developed superconducting lumped element kinetic inductance detectors on a stoichiometric lithium niobate substrate to enhance phonon collection efficiency. To reduce the substrate loss, Surface Activated Bonding (SAB) technology with a sapphire substrate has been applied. The application of SAB has demonstrated its effectiveness for advanced particle detector development.

TILA-LIC7-03 16:15

Surface Smoothing Based on Polyimide/PDMS Template Stripping for Low-Temperature Bonding of Heat Dissipating Ceramics

Shintaro Goto, Shogo Koseki, Kai Takeuchi, Eiji Higurashi
Tohoku University

A surface smoothing technique for low-temperature bonding of heat dissipating ceramics was developed. A rough surface of an AlN ceramic substrate was smoothed via Au film transfer based on polyimide/PDMS template stripping and surface-activated bonding. Room-temperature solid-state bonding between the smoothed AlN substrate and a Si chip was achieved.

TILA-LIC7-04 16:30

Analysis of the plasma with intermediate optical thickness for laser-induced breakdown spectroscopy

Tetsuo Sakka, Masashi Shintani, Yuko Yokoyama, Naoya Nishi
Kyoto University

Laser-induced breakdown spectroscopy is applied to quantitative analysis using the intensities of atomic emission spectral lines. However, the spectral intensities often suffer from self-absorption. In this work we propose a method for the analysis of emission spectra from optically thick plasma with continuum emission.

TILA-LIC7-05 16:45

Investigation of thermal properties of Cr:LiSAF/Sapphire bonded materials

Florent Cassouret[1], Yoichi Sato[2,1], Takunori Taira[2,1]
[1]Institute for Molecular Science, [2]RIKEN SPring-8 center

Successful bonding between Cr:LiSAF and Sapphire single crystals was achieved. The thermal properties of the bulk and bonded samples were measured between 25 and 100ºC. A 4-time improvement of thermal conductivity was demonstrated for Cr:LiSAF sandwiched by two sapphires with 9.84 W/mK compared to bulk (2.52 W/mK) at room temperature.

NOTE

Oral, Friday, 25 April AM

ALPS <Room 511+512>

[ALPS-H1] 9:30-10:45
Biomedical Optical Imaging
Chair: Masayuki Suzuki
Doshisha Univ.

ALPS-H1-01 9:30 ***Invited***

Short-wavelength infrared ultrafast lasers based on fluoride fibers
Takao Fuji
Toyota Technological Institute

This talk will present recent advances in short wavelength infrared ultrafast lasers using fluoride fibers. These sources offer significant potential for applications such as biomedicine, telecommunications, and high field physics.

BISC <Room 419>

[BISC6] 9:00-10:30
Advanced Microscopy I
Chair: Osamu Matoba
Kobe University

BISC6-01 9:00

Hand-held fiber optic ultraviolet surface excitation scanner for rapid histology of thick tissue
Alexander Yong[1,2], Muhammad Safwan Burhanudin[1], Kaicheng Liang[1]
[1]Nanyang Technological University, School of Chemistry, Chemical Engineering and Biotechnology, [2]Nanyang Technological University, School of Electrical and Electronic Engineering

We developed the first hand-held fibre-optic ultraviolet surface excitation scanner for quantitative sensing and imaging of samples. Our study showcases the possibility of minimally invasive ultraviolet endoscopy for real-time cellular visualisation of living organs.

BISC6-02 9:15

Unconventional surface plasmon microscopy: visual cortex of rodents
Ipsita Chakraborty, Andreas Offenhäusser
FZJ, Germany

Surface plasmon microscopy is a robust, label free, real time, optical technique conventionally used to determine analyte concentration and binding for various applications. We perform refractive index and birefringence analysis of visual cortex of rodents with a developed unconventional surface plasmon microscopic technique.

BISC6-03 9:30 ***Invited***

Ultrathin fibre endoscope based on computational imaging techniques
Lipei Song, Yongkang Zhang, Guowei Liu, Zhixiang Jiang
Institute of modern Optics, Nankai University, China

The challenges for ultrathin endoscopes with optical fiber are to reconstruct the image information efficiently that merges into the fiber modes and to minimize the fiber bending influences. In this report, we present our work on imaging with a few mode fiber and a thin fiber bundle based on computational imaging techniques to realize high-resolution imaging with small tip sizes.

HEDS <Room 311+312>

[HEDS11] 9:00-9:50
Plasma kinetics 2
Chair: Shinsuke Fujioka
Osaka University

HEDS11-01 9:00 ***Invited***

Experimental observations of electron Bernstein waves embedded in scattered spectra of intense laser
Kentaro Sakai[1], Kosuke Himeno[2], Tatiana Pikuz[2], Takafumi Asai[3], Shuta Tanaka[4], Takumi Minami[2], Yuki Abe[2], Fuka Nikaido[2], Masato Kanasaki[3], Hiromitsu Kiriyama[5], Akira Kon[5], Kotaro Kondo[5], Nobuhiko Nakanii[5], Wei-Yen Woon[6], Che-Men Chu[6], Kuan-Ting Wu[6], Chun-Sung Jao[7], Yao-Li Liu[7], Hideki Kohri[2], Atsushi Tokiyasu[8], Shogo Isayama[9], Harihara Sudhan Kumar[8], Kentaro Tomita[10], Yuji Fukuda[5], Yasuhiro Kuramitsu[2]
[1]National Institute for Fusion Science, [2]Osaka University, [3]Kobe University, [4]Aoyama Gakuin University, [5]Kansai Institute for Photon Science, [6]National Central University, [7]National Cheng Kung University, [8]Tohoku University, [9]Kyushu University, [10]Hokkaido University

We observed scattered spectrum of intense laser interacting with hydrogen uniform and structured plasmas. The observed periodic spectra can be explained by electron Bernstein wave resonance and one can estimate magnetic field from the periodic length.

HEDS11-02 9:25 ***Invited***

Characterization of Au L-shell X-rays in Ion Acceleration Experiment with Ultra-intense Short Pulse Laser
Chang Liu[1], Masayasu Hata[1], James Kevin Koga[1], Hazel Lowe[1], Kotaro Kondo[1], Kon Akira[1], Hironao Sakaki[1], Hiromitsu Kiriyama[1], Nicholas Peter Dover[2], Ed Hill[2], Nuo Xu[2], Ginevra Casati[2], Zulfikar Najmudin[2], Pengjie Wang[3], Tim Ziegler[3], Marvin Elias Paul Umlandt[3], Milenko Andres Vescovi Pinochet[3], Karl Zeil[3], Ulrich Schramm[3], Stephan Fritzsche[4,5,8], Shinichi Namba[6], Natsumi Iwata[7], Yasuhiko Sentoku[7], Mamiko Nishiuchi[1]
[1]National Institutes for Quantum Science and Technology, [2]Imperial College London, [3]Helmholtz-Zentrum Dresden-Rossendorf, [4]Helmholtz-Institut Jena, [5]GSI Helmholtzzentrum für Schwerionenforschung, [6]Hiroshima University, [7]Osaka University, [8]Friedrich-Schiller-Universität Jena

The acceleration of heavy gold ions by femtosecond lasers is challenging due to limited understanding of ionization mechanisms, particularly in the RIT regime. We measured ion parameters, transmitted energy, and plasma spectra using X-ray CCD while scanning target thickness. Results show 70+ charge gold ions at >10 MeV/u in RIT. Simulations confirm collisional ionization is crucial in this regime.

[HEDS12] 9:50-10:35
Strong field and radiations
Chair: Natsumi Iwata
Osaka University

HEDS12-01 9:50 ***Invited***

Relativistic kinetic theory for nonlinear QED particles in high-intensity laser pulse
Keita Seto
Japan Atomic Energy Agency

We will discuss the relativistic kinetic theory of charged particles in the nonlinear QED/scalar QED regime for multiple scattering effects in a high-intensity laser pulse. The notable point of this research was the challenge to derive the transport equations of charged particles from nonlinear QED.

Oral, Friday, 25 April AM

LSC <Room 421>

[LSC7] 9:00-10:30
New techniques and theory (2)
Chair: Toshihiko Shimizu
Osaka University

LSC7-01 9:00 ***Invited***

Evaluation Review of VUV Emitting Scintillation Materials using UVSOR Synchrotron Beam

Shunsuke Kurosawa
Tohoku University

Vacuum Ultra-Violet (VUV) emitting scintillators have short decay times of less than 20 ns originating from 5d-4f transition of Nd^{3+} or other rare-earth elements, and such scintillators can be applied to high rate counting. In this paper, I review the recent results of the optical properties for the VUV scintillators using the Synchrotron beam of Ultra Violet Synchrotron Orbital Radiation (UVSOR).

LSC7-02 9:20 ***Invited***

Modification of optical material surfaces for THz waves

Shingo Ono[1], Hiumi Terashima[1], Haruto Miura[1], Verdad Canila Agulto[2], Marilou Cadatal Raduban[3,2], Kohei Yamanoi[2], Makoto Nakajima[2], Michal Kohout[4], Zdeněk Hubička[4], Jiří Olejníček[4], Satoru Maegawa[1], Fumihiro Itoigawa[1]
[1]Nagoya Institute of Technology, [2]Institute of Laser Engineering, Osaka University, [3]Unitec Institute of Technology, [4]Czech Academy of Sciences

The moth-eye structures with AR coating were successfully developed by using femtosecond-pulsed laser processing and hot hollow cathode deposition. They improve the mechanical strength and optical properties in THz region, contributing to the practical application of THz waves.

LSC7-03 9:40 ***Invited***

Bridging Scales: X-ray Spectroscopy from Table-Top to Large-Scale Light Source Facilities

Zhong Yin
Tohoku University

Advancements in modern light sources have revolutionized the study of electronic structures, enabling techniques like soft X-ray spectroscopy with unprecedented brilliance, coherence, and ultrafast resolution. This talk presents results on complex systems using synchrotron facilities and HHG-based water-window table-top sources. It highlights how these sources can be utilized to yield different yet complementary information.

OMC <Room 418>

[OMC10] 9:00-10:15
Session 8
Chair: Kishan Dholakia
University of Adelaide

OMC10-01 9:00 ***Invited***

Optical trapping with gold nanoparticles for chiral crystallization: Size-dependent enantioselectivity switch

Hao-Tse Su[1], Hiromasa Niinomi[2], An-Chieh Cheng[3], Yoshito Y. Tanaka[4], Keiji Sasaki[4], Teruki Sugiyama[1,5]
[1]National Yang Ming Chiao Tung University, [2]Tohoku University, [3]National Institute of Natural Sciences, [4]Hokkaido University, [5]Nara Institute of Science and Technology

This study reveals an enantioselectivity switch in sodium chlorate crystallization using optical trapping with gold nanoparticles (AuNPs). Changing AuNP size reverses the preferred chirality of the crystals. This is due to the interplay of optical forces and plasmonic heating, which affect the balance between chiral forms. Smaller AuNPs induce a force favoring one chirality, while larger AuNPs cause "over-twisting," favoring the opposite.

OMC10-02 9:30

Helical periodic relief on two-photon polymerized microstructures formed by femtosecond optical vortex

Kyoko Masui, Yoshihisa Matsumoto, Chie Hosokawa
Osaka Metropolitan University

Two-photon polymerized cylindrical microstructures with a helical periodic relief smaller than the diffraction limit were obtained using a femtosecond optical vortex beam. The helical direction depended on the sign of the topological charge.

OMC10-03 9:45

High-speed AFM real-time observation of optical vortex induced helical mass transfer of azopolymers

Kota Kojimoto[1], Rihito Tamura[2], Feng-Yueh Chan[3], Takayuki Uchihashi[3], Prabhat Verma[1], Takashige Omatsu[2], Takayuki Umakoshi[1]
[1]Osaka University, [2]Chiba University, [3]Nagoya University

Azopolymers form twisting reliefs under optical vortex irradiation via orbital angular momentum transfer. We constructed high-speed AFM combined with an optical vortex beam, and demonstrated real-time observation of nanoscale twisting dynamics of azopolymers.

OWPT <Room 416+417>

[OWPT8] 9:30-10:30
Session 8
Chair: Takeo Maruyama
Kanazawa Univ.

OWPT8-01 9:30 ***Invited***

Challenges and Solutions in Optical Wireless Power Large Scale Manufacturing

Ortal Alpert, Lior Golan, Ori Mor
Wi-Charge LTD.

Designing and constructing OWPT systems for mass production taking advantage of "economies of scale". Adapting the power level to meet the needs of different applications Several methods for tailoring the power delivery specifications to client device.

Oral, Friday, 25 April AM

TILA-LIC <Room 315>

[TILA-LIC8] 9:00-10:30
Nonlinear & plasmonic devices
Chair: Yoichi Sato
RIKEN SPring-8 Center, Japan

TILA-LIC8-01 9:00 ***Invited***

Self-Q-switched Plasmon assisted Nanolasing

Mariola Ramirez, Pablo Molina, David Hernandez-Pinilla, Guillermo Lopez-Polin, Pablo Ares, Julio Gomez-Herrero, Luisa E Bausa
Autonomous University of Madrid, Spain

We present a monolithic laser design that integrates monolayer MoS_2, silver nanoparticle chains, and Nd^{3+}-doped lithium niobate to achieve self-Q-switching plasmon-assisted nanolasing. The system generates stable laser pulse trains while featuring subwavelength nanolasing spatial confinement.

TILA-LIC8-02 9:30 ***Invited***

Combining ferroelectrics and 2D materials for nanophotonics

Luisa Bausá, Mariola Ramirez, Jaime Fernandez-Tejedor, Daniel Gallego, Javier Fernandez-Martinez, Pablo Molina, David Hernandez-Pinilla, Julio Gomez-Herrero, Pablo Ares
Autonomous University of Madrid, Spain

The combined effect of light and ferroelectricity on the optoelectronic properties of monolayer MoS_2 deposited on PPLN is explored. The results reveal photoinduced charge modulation in MoS_2 and deterministic p-n junctions useful for advanced optoelectronics.

TILA-LIC8-03 10:00

Control of Two-Color Supercontinuum Generation in Liquids and Solids: from novel Broadband Radiation Source to Nonlinear Buried interface Observations

Tsuneto Kanai[1], ChengXiang Jin[1,2], Hibiki Tsunekawa[1,2], Atsunori Sakurai[1,2,3], Toshiki Sugimoto[1,2,3]
[1]Institute for Molecular Science, [2]Graduate Institute for Advanced Studies, [3]RIKEN

By using a dissonant two-color filamentation scheme, we demonstrate dramatic enhancement of Kerr-dominated supercontinuum generation in water, whose efficiency is three orders of magnitude higher than the so-called harmonics-enhanced supercontinuum generation in the plasma-dominated regime.

TILA-LIC8-04 10:15

Wavelength tunable fiber optical parametric oscillator for coherent anti-Stokes Raman scattering

Yizhou Liu[1,4], Hao Zhang[3,4], Jingyi Cui[2], Pu Wang[3], Zhigang Zhang[2], Aimin Wang[2], Lishuang Feng[3]
[1]Shandong University, [2]Peking University, [3]Beihang University, [4]Beijing Fatonics Technology Co., Ltd.

We present a fiber-based optical parametric oscillator (FOPO) for the nonlinear microscopy, based on the broadband mode-locked fiber laser with tunable repetition rate. The wavelength of the Stokes pulses could be independently tuned between 1039 and 1064 nm with the output power higher than 1 W. The pump pulses could be tuned between 796 and 990 nm with the output power higher than 100 mW.

----- Coffee Break 10:30-11:00 -----

NOTE

Oral, Friday, 25 April AM

ALPS <Room 303>

[ALPS-E1] 10:45-12:00
Short wavelength light sources and applications (1)
Chair: Keisuke Kaneshima
University of Hyogo

ALPS-E1-01 10:45 ***Invited***

Generation, Measurement and Application of Isolated Attosecond X-Ray Pulses at the LCLS
Taran Driver[1,2]
[1]Stanford PULSE Institute, [2]SLAC National Accelerator Laboratory
I will describe recent advances in attosecond X-ray pulse generation at the Linac Coherent Light Source free-electron laser, and several new measurements of ultrafast electron motion in molecules that this technology has enabled.

ALPS <Room 511+512>

ALPS-H1-02 10:00

Accuracy improvement of biological tissue analysis using mid-infrared photoacoustic spectroscopy
Kiiko Aiba, Saiko Kino, Yuji Matsuura
Graduate School of Engineering, Tohoku University
Non-invasive blood component analysis by mid-infrared photoacoustic spectroscopy detecting ultrasound was studied. With the sample fixed, accuracy of blood glucose measurement was improved by accounting for the time lag between interstitial fluid and blood components.

ALPS-H1-03 10:15

Development of high-resolution optical coherence microscopy (OCM) at 830 nm wavelength range
Hidekatsu Ohashi, Shotaro Kitajima, Norihiko Nishizawa
Nagoya Univ.
We developed high resolution SD-OCM system at 830 nm wavelength, achieving 97.5 dB sensitivity, 3.4 μm axial in tissue, and 2.3 μm lateral resolutions for detailed biological imaging.

ALPS-H1-04 10:30

Mid-infrared Photothermal Deflection Spectroscopy System for Non-Invasive Tissue Analysis —Fundamental Study for Improvement of Measurement Accuracy—
Hiroto Ito[1], Saiko Kino[1], Mitsuru Tomoita[2], Yuji Matsuura[1]
[1]Tohoku University, [2]Nippon Electric Glass Co., Ltd.
A photothermal deflection spectroscopy system using a mid-infrared laser is proposed. In the system, a probe light detecting the heat induced by mid-infrared light absorption passes parallel to the top of the prism. The improvement of reproducibility in the measurement of biological tissues was examined.

----- Coffee Break 10:45-11:00 -----

BISC <Room 419>

BISC6-04 10:00

Transforming Wide-Field Endomicroscopy: A Deep Learning Approach for Enhanced Optical Sectioning
Meng-Chen Chung[1,2], Chia-Yu Lin[1], Yu-Hsin Chia[1], Yuan Luo[2,3,4]
[1]Department of Biomedical Engineering, National Taiwan University, [2]Institution of Medical Device and Imaging, National Taiwan University, [3]YougLin Institute of Health, National Taiwan University, [4]Program for Precision Health and Intelligent Medicine, National Taiwan University
This study presents a novel approach to enhance optical endoscopy image quality by integrating histogram matching with a Res-UNet deep learning model. Utilizing a dataset of 3,454 paired images, the method significantly improves PSNR and SSIM metrics, enabling real-time imaging while achieving optical sectioning.

BISC6-05 10:15

Ultra-dense high numerical aperture coherent optical bundles
Rafał Kasztelanic[1,2], Dariusz Pysz[1], Ireneusz Kujawa[1], Rafal Czajkowski[3], Ryszard Buczynski[2,1]
[1]Institute of Microelectronics and Photonics, [2]Physics Department, University of Warsaw, [3]Nencki Institute of Experimental Biology PAS
Coherent imaging bundles with a high numerical aperture and core diameter of less than 2 μm have been fabricated, tested, and used for fluorescence biological imaging.

----- Coffee Break 10:30-11:00 -----

HEDS <Room 311+312>

HEDS12-02 10:15

The Brightest Terawatt Gamma Flash
Alexander Pirozhkov[1], A. Sagisaka[1], K. Ogura[1], E. Vishnyakov[2], A. Shatokhin[3], C. Armstrong[4], T. Esirkepov[1], B. Gonzalez-Izquierdo[1,5], T. Pikuz[6], P. Hadjisolomou[2], M. Alkhimova[7], C. Arran[8], I. Tsygvintsev[9], P. Valenta[2], S. Pikuz[10], W. Yan[2,11], T.-M. Jeong[2], S. Singh[12,13], O. Finke[2], G. Grittani[2], M. Nevrkla[2], C. Lazzarini[2,14], A. Velyhan[2], T. Hayakawa[1], Y. Fukuda[1], J. Koga[1], M. Ishino[1], Ko. Kondo[1], Y. Miyasaka[1], A. Kon[1], M. Nishikino[1], E. Nosach[15], D. Khikhlukha[2], A. Kolesnikov[3], E. N. Ragozin[3], V. A. Gasilov[16], D. Kumar[2], J. Nejdl[2], P. V. Sasorov[2], S. Weber[2], D. Margarone[2], Y. Kato[6], G. Korn[2,5], H. Kiriyama[1], K. Kondo[1], C. Ridgers[8], T. Kawachi[1], M. Kando[1], S. V. Bulanov[1,2]
[1]KPSI QST, [2]ELI-Beamlines, [3]LPI RAS, [4]CLF RAL, [5]Marvel Fusion, [6]Osaka University, [7]JIHT RAS, [8]University of York, [9]ISTEQ AR, [10]HB11 Energy Holdings, [11]Shanghai Jiao Tong University, [12]IPP ASCR, [13]FZU-IoP ASCR, [14]Czech Technical University in Prague, [15]IoP NAS, [16]KIAM RAS
Gamma Flash (GF) is one of the most promising laser-plasma interaction regimes with conversion efficiency of up to 40%. We demonstrated GF dominant regime[arXiv:2410.06537 (2024)], where it scaled quickly with laser power and exceeded Bremsstrahlung. 3D Hydro+PIC simulations revealed attosecond TW GF with nano-source and brightness of $>10^{23}$photons/mm2mrad2s0.1%BW, surpassing astrophysical GRBs.

----- Coffee Break 10:35-10:50 -----

[HEDS13] 10:50-11:50
Plasma and astrophysics
Chair: Yasuhiko Sentoku
Osaka University

HEDS13-01 10:50

Kinetic Simulations of Linearly Polarized Electromagnetic Waves in Electron-Positron Plasmas
Masanori Iwamoto, Kunihito Ioka
Kyoto University
Fast radio bursts are extremely bright, linealy polarized astrophysical radio transients. Since such strong waves are subject to the non-linear wave–plasma interaction, the radio pulses are modified while propagating through astrophysical plasmas. We will discuss the time evolution of the radio waves by using kinetic simulations.

Oral, Friday, 25 April AM

FAAP <Room 412>

[FAAP4] 10:00-11:40
Session 4
Chair: Taro Fukuyama
Tamagawa University

FAAP4-01 10:00 ***Invited***

The Future of Food Supply and Demand and the Role of Science and Technology
Atsushi Shinjo
Keio University
The global population is set to exceed 9 billion, causing food security concerns. Japan faces challenges with an aging and declining farming population. This presentation will explore how science and technology can address future food supply issues in Japan and globally.

FAAP4-02 10:30 ***Invited***

Fluorescence imaging for detecting bio-material surface changes
Naoshi Kondo
Kyoto University
Most biological materials fluoresce and their properties change according to their age, quality, growing environment, and other reasons. Their information of specific excitation based images is useful for sustainable food production.

LSC <Room 421>

LSC7-04 10:00

Development of a high-coherence and ultrashort pulsed electron source
Riyo Nagao[1], Gaël Privault[1], Yui Iwasaki[1], Godai Noyama[1], Yusuke Arashida[1], Hiroo Suzuki[2], Yasuhiko Hayashi[2], Arnaud Arbouet[1,3], Jun-ichi Fujita[1], Masaki Hada[1]
[1]University of Tsukuba, [2]Okayama University, [3]CNRS, DYNACOM
We developed a high-coherence and ultrashort pulsed electron source using a tungsten tip as a photocathode to directly observe structural dynamics from nanoscale structures. In this study, the coherence length and duration of the electron pulses were experimentally and numerically estimated.

LSC7-05 10:15

Luminescence properties of Ce:LiCAF Scintillator under High Pressure condition
Masanori Takigawa[1,4], Marilou Cadatal Raduban[1,2,3], Luong Viet Mui[4], Yuki Shibazaki[5], Toshihiko Shimizu[1], Nobuhiko Sarukura[1,6], Kohei Yamanoi[1]
[1]Institute of Laser Engineering, Osaka University, [2]Unitec Institute of Technology, [3]Centre for Theoretical Chemistry and Physics, Massey University, [4]Graduate School of Engineering, Osaka University, [5]Institute of Materials Structure Science, High Energy Accelerator Research Organization (KEK), [6]New Industry Creation Hatchery Center, Tohoku University
Ce:LiCAF crystals, with short fluorescence lifetime but low light output, were studied under high pressure to improve their performance. Structural phase transitions were observed above 7.7 GPa using X-ray diffraction. At 7.9 GPa, the luminescence spectrum shifted to longer wavelengths, suggesting structural changes can enhance light output.

----- Coffee Break 10:30-11:00 -----

[LSC8] 11:00-12:55
New techniques and theory (3)
Chair: Shingo Ono
Nagoya Institute of Technology

LSC8-01 11:00 ***Invited***

Streaming powder technique for the study of non-reversible phenomena with X-ray diffraction and Infrared spectroscopy
Gael Privault[1,2,5], Marius Hervé[2,5], Nicolas Godin[2,5], Roman Bertoni[2,5], Elzbieta Trzop[2,5], Yves Watier[7], Ievgeniia Chaban[2,5], Ricardo Guillermo Torres Ramírez[2,5], Celine Mariette[7], Alix Volte[7], Marco Cammarata[7], Matteo Levantino[7], Shintaro Akagi[1], Masaki Hada[1], Jacek Kubicki[4], Serhane Zerdane[8], Hiroko Tokoro[1,5], Shin-ichi Ohkoshi[3,5], Eric Collet[2,5,6]
[1]University of Tsukuba, [2]University of Rennes, [3]University of Tokyo, [4]University of Poznań, [5]International laboratory DYNACOM, [6]Inst. Univ. de France, [7]The European Synchrotron (ESRF), [8]Swiss X-ray Free Electron Laser (SwissFEL)
We combined a streaming powder methodology with an ultrafast Infrared experiment and an X-ray diffraction set-up at the European Synchrotron Radiation Facility (ESRF), to study non-reversible dynamics in a Prussian blue analogue compound (RbMnFe) at room temperature. Those complementary study enabled to distinguish two different fluences regimes: the polaronic and the persistent PIPT one.

OMC <Room 418>

OMC10-04 10:00

Possibility of Enantioselective Optical Force Exerted on Chiral Crystalline Clusters near a Si Metasurface as a Cause of the Large Crystal Enantiomeric Excess
Hiromasa Niinomi[1], Kazuhiro Goto[2], Miho Tagawa[3], Iori Morita[4], Akiko Onuma[1], Hiroshi Y. Yoshikawa[5], Ryuzo Kawamura[6], Tomoya Oshikiri[1,7], Masaru Nakagawa[1]
[1]Institute of Multidisciplinary Research for Advanced Materials, Tohoku University, [2]Graduate School of Science and Technology, Niigata University, [3]Institute of Materials and Systems for Sustainability, Nagoya University, [4]Research Institute of Electrical Communication, Tohoku University, [5]Graduate School of Engineering, Osaka University, [6]Department of Chemistry, Saitama University, [7]Research Institute for Electronic Science, Hokkaido University
We analized the magnitude of enantioselective optical force exerted on sodium chlorate ($NaClO_3$) chiral crystalline clusters in the vicinity of the Mie-resonant silicon metasurface on which statistically significant chiral imbalance could be observed in $NaClO_3$ chiral crystallization from a solution. The magnitide was estimated to be in the order of fN, which is capable of manipulating nanoparticles with the size of several tens of nanometer.

----- Coffee Break 10:15-10:45 -----

[OMC11] 10:45-12:00
Session 9
Chair: Chie Hosokawa
Osaka Metropolitan University

OMC11-01 10:45 ***Invited***

Using optical traps to place microscopic lasers into live cells for sensing and barcoding
Malte Gather
University of Cologne
Whispering gallery mode microlasers are exquisite sensors and markers for live cells. Using tailored optical trapping, we demonstrate improved cellular delivery of these lasers. We also show recent advances in laser-based sensing.

OWPT <Room 416+417>

OWPT8-02 10:00

Extending Flight Height and Duration of Micro-drone by OWPT Dynamic Charging
Tomoya Watamura, Takuo Nagasaka, Tomoyuki Miyamoto
Institute of Science Tokyo
For unlimited flight time of micro-drones, dynamic charging by OWPT is promising. In this report, light beam shape control by zoom lens was investigated to extend flight height of a micro-drone. By optimizing the lenses positions, a vertical flight of up to 150 cm was achieved with a 35 W VCSEL array output. In addition, the OWPT power supply to the free-flying micro-drone was tested.

OWPT8-03 10:15

Modeling and Numerical Characterization of Optical Wireless Power Transmission in Rotating Mechanisms
Yuxuan Qiu, Tomoyuki Miyamoto
Institute of Science Tokyo
Optical Wireless Power Transmission (OWPT) enables efficient, contactless energy transfer for rotating systems. This research evaluates a 1 W Gaussian light source on a 10 cm2 photovoltaic cell rotating at a 20 cm radius. Results show that when the PV fully utilizes the beam's energy, maximum power reaches 28.1 W with 7.8% efficiency.

----- Coffee Break 10:30-11:00 -----

Oral, Friday, 25 April AM

TILA-LIC <Room 315>

[TILA-LIC9] 11:00-12:00
THz & deep UV generation
Chair: Hideki Ishizuki
RIKEN SPring-8 Center, Japan

TILA-LIC9-01 11:00 ***Invited***

A study of gain media for a laser driver for fusion as part of the UPLiFT project
Luke McHugh, Agnieszka Wojtusiak, Rajan Mistry, Paul Mason, Robbie Scott, Thomas Butcher
Central Laser Facility, STFC Rutherford Appleton Laboratory, UK
An overview of the UK Project: Laser inertial Fusion Technology for energy (UPLiFT), including an extensive study to investigate the suitability of candidate gain media for a laser driver for fusion.

TILA-LIC9-02 11:30

Innovative Sub-Terahertz-Wave Source for Non-Destructive Applications
Yuma Takida, Joselito Muldera, Alexander De Los Reyes, Hiroaki Minamide
RIKEN
We have demonstrated high-brightness backward terahertz (THz)-wave parametric oscillators (BW-TPOs) with a wide and continuous frequency tunability in the sub-THz frequency region from 0.25 to 1.0 THz for non-destructive imaging and sensing applications.

TILA-LIC9-03 11:45

Sub-nanosecond High Energy Laser Pulse Wavelength Conversion to Deep-UV
Kenichi Hirosawa[1], Nobuo Ohata[1], Hideho Odaka[2,3], Arvydas Kausas[2,3], Vincent Yahia[3,2], Takunori Taira[2,3]
[1]Mitsubishi Electric Corporation, [2]RIKEN SPring-8 Center, [3]Institute for Molecular Science
We use a 1064 nm laser with sub-nanosecond 2J pulses to convert to 266 nm. At 2 Hz, we achieve 235 mJ, but at 10 Hz, energy drops to 133 mJ due to nonlinear absorption. This report examines the repetition rate dependence of high-energy pulse wavelength conversion.

----- Lunch 12:00-13:30 -----

NOTE

Oral, Friday, 25 April AM

ALPS <Room 303>

ALPS-E1-02 11:15 *Invited*

Unique Machine Modes of Hard X-ray Free-Electron Lasers and their Applications

Ichiro Inoue[1,2]
[1]*RIKEN SPring-8 Center,* [2]*University of Hamburg*

Unique ultrafast X-ray pulses generated through specialized operation modes of X-ray free-electron lasers and their applications are presented and discussed.

ALPS-E1-03 11:45

Efficient generation of femtosecond 11 eV beams by third harmonics generation in Kr and Xe and its separation by spatial shaping

Yimin Gu[1], Takayuki Kurihara[1], Tomoya Mizuno[1], Ahmed R. A. Ibrahim[2], Teruto Kanai[1], Jiro Itatani[1]
[1]*The Institute for Solid State Physics,* [2]*RIKEN*

We demonstrate an efficient generation of femtosecond 11 eV beams from a turnkey Yb:KGW laser system by cascaded third harmonics generation (THG). Spatial filtering of the fundamental driver beam to a donut shape is shown to efficiently separate the 11-eV from the fundamental 343 nm beam.

----- Lunch 12:00-13:15 -----

ALPS <Room 511+512>

[ALPS-H2] 11:00-12:30
Photoacoustic Imaging
Chair: Yoshihisa Yamaoka
Komatsu Univ.

ALPS-H2-01 11:00 *Invited*

Multi-Modal Imaging: Photoacoustic Imaging Plus More

Chulhong Kim
Pohang University of Science and Technology

We developed multimodal imaging systems (PAM, OCT, FLI, USI) and a clinical PA/US platform, achieving preclinical and clinical success in cardiology, dermatology, neurology, and pathology, bridging small animal to human applications.

ALPS-H2-02 11:30

High-sensitivity detection of cancer cells using aptamer-based terahertz chemical microscope

Tsuneyuki Ozaki
INRS-EMT

Using an aptamer-based terahertz chemical microscope, we demonstrate high-sensitivity detection of breast cancer cells. The limit-of-detection is 1 cancer cell in 100 microL of sample with a measurement time of 15 minutes.

ALPS-H2-03 11:45

Analysis of Effect of lattice period on the viewing angle of a metalens

Kosuke Nishiura[1], Atsushi Hasegawa[1], Keisuke Ozawa[2], Yuki Abe[2], Mineki Taoka[2], Takeshi Yamagishi[2], Kentaro Iwami[1]
[1]*Tokyo University of Agriculture and Technology,* [2]*Samsung R&D Institute Japan*

We analyze metalenses with period of 340 nm and 404 nm from the previous study and propose a new metalens with period of 266 nm to increase the viewing angle.

ALPS-H2-04 12:00

Long-Range Swept-Source OCT Imaging with Real-Time Calibration using HCG-VCSEL Laser

Chien-Hua Peng[1], Jian-Zhi Wang[1], Hao-Hsun Chung[1], Jyh-Tsung Hsieh[2], Hsiang-Chieh Lee[1]
[1]*National Taiwan University,* [2]*Bandwith10 Ltd*

In this study, we have developed a SS-OCT system using an HCG-VCSEL wavelength-swept laser with a calibration interferometer for real-time k-calibration, achieving real-time, long-range imaging of a full eye model and a stepped 3D-printed model at an A-scan rate of 30 kHz.

ALPS-H2-05 12:15

Development of Refractive Index Correction based Image Registration with Multi-view Optical Coherence Tomography (OCT) for Tooth Imaging

Yin-Shen Cheng[1], Pei-Chen Sung[1], Zi-Wen Kao[1], Fang-Ying Hua[2], Ting-Hao Chen[1], Chuan-Bor Chueh[1], Yin-Lin Wang[2], Hsiang-Chieh Lee[1]
[1]*Natioanl Taiwan University,* [2]*National Taiwan University Hospital*

In this study, a novel swept-source OCT system is proposed for dental diagnosis. With in-house developed refractive index correction-based image stitching algorithm, the results show the feasibility of our system and enhancement of image quality.

BISC <Room 419>

[BISC7] 11:00-12:15
Advanced Microscopy II
Chair: Tatsuki Tahara
National Institute of Information and Communications Technology

BISC7-01 11:00 *Invited*

Three-Dimensional and High-Resolution Imaging by Wavefront Engineered Light Needle Scanning Microscopy

Yuichi Kozawa, Daisuke Kume, Yuuki Uesugi, Shunichi Sato
Tohoku University

We present a novel laser scanning microscope technique that can acquire three-dimensional images from a single scanning of a light needle excitation spot, offering the rapid acquisition speed of three-dimensional imaging.

BISC7-02 11:30

Two-photon microscopy at ~kHz volumetric speed

Ho-Chia Tsia, Chung-Ming Chen, Shi-Wei Chu
National Taiwan University

We demonstrate the feasibility of a nearly kilohertz two-photon volumetric functional imaging using inertia-free lateral and axial scanning with a diffractive optical element and a tunable acoustic gradient-index lens, respectively.

BISC7-03 11:45 *Invited*

Multiplexed Nanoscopy Reveals the Molecular-Resolution Constitution of Mammalian Centrioles

Ting-Jui Ben Chang, Tony Yang
National Taiwan University, Taiwan

We introduce buffer-exchanged dSTORM (beSTORM), enabling multitarget nanoscopy imaging with minimal crosstalk. This highly compatible platform promises significant advancements for exploring multiple targets in biological systems at molecular resolution.

----- Lunch 12:15-13:30 -----

HEDS <Room 311+312>

HEDS13-02 11:10

Relativistic Resonant and Wakefield Acceleration Driven by Large Amplitude Alfvén Waves

Shogo Isayama[1], Shuichi Matsukiyo[1], Takayoshi Sano[2], Shih Hung Chen[3]
[1]*Kyushu University,* [2]*ILE Osaka University,* [3]*National Central University, Taiwan*

In this study, we propose a novel acceleration mechanism driven by large-amplitude Alfvén waves and self-generated counter-propagating waves via decay instability. The decay process produces counter-propagating waves, enabling particles to undergo efficient cyclotron resonance. Furthermore, the accelerated particles generate large-amplitude wakefields trailing the Alfvén wave packets, which subsequently lead to wakefield acceleration.

HEDS13-03 11:30

Parametric decay instability of circularly polarized Alfven waves in magnetically dominated plasma

Wataru Ishizaki
Tohoku University

Motivated by research about Fast Radio Bursts, the stability of Alfven waves in a relativistically magnetized plasma was investigated. We find that the decay instability grows even in magnetically dominated plasmas.

[HEDS-CL] 11:50-12:00
Closing Remarks
Chair: Natsumi Iwata
Osaka University

Oral, Friday, 25 April AM

FAAP <Room 412>

FAAP4-03 11:00

High sensitivity tapered fiber optic sensor coupled with a support vector machine for the identification of red wine

Jesus Alberto Parada[1], Juan Carlos Hernandez-Garcia[2], Raul Enrique Sánchez-Yáñez[1], Juan Manuel Sierra-Hernandez[1], María Susana Avila-Garcia[1], Marco Bianchetti[1], María Elena Sosa-Morales[1], Stefano Toffanin[3], Julian Moises Estudillo-Ayala[1], Roberto Rojas-Laguna[1]
[1]Division de Ingenierías CIS, Universidad de Guanajuato, Salamanca, Gto, México, [2]Investigadoras e investigadores por México CONAHCYT, CDMX, México, [3]Institute of Nanostructured Materials Italian National Research Council, Bologna Italy

A fiber optic fiber tapered, coupled with a support vector machine classifier, identifies red wines with 99.847% accuracy, analyzing 1680 spectral samples, showing potential for quality control in the wine industry.

FAAP4-04 11:20

Early Detection of Water Stress in Plants using Frequency-Domain Fluorescence Lifetime Imaging Microscopy (FD-FLIM)

Cheng-Hao Lin, Hsiao-Mei Wu
Department of Biomechatronics Engineering, National Taiwan University

Fluorescence lifetime imaging microscopy allows precise, non-invasive, and early detection of photosynthetic efficiency. We optimized LED-based FD-FLIM to overcome the limitations of high-frequency modulation, providing a robust tool for the detection of stress in plants.

----- Lunch 11:40-13:00 -----

LSC <Room 421>

LSC8-02 11:20 *Invited*

Scanning transmission X-ray microscopy for radioactive materials: Analysis on the Fe-U-Zr oxides aimed for the decommissioning work

Goro Shibata[1], Tsuyoshi Yaita[1,2], Kenta Yoshida[3], Yuji Arita[4], Ayumi Itoh[5], Toru Higuchi[6], Kenji Konashi[3]
[1]Japan Atomic Energy Agency, [2]National Institute for Quantum Science and Technology, [3]Tohoku University, [4]University of Fukui, [5]Institute of Science Tokyo, [6]Nippon Nuclear Fuel Development

We will introduce an overview of our STXM apparatus at SPring-8 BL23SU and will present the results of the STXM measurements of Fe-U-Zr-O thin films using a sample cell dedicated for radioactive materials.

LSC8-03 11:40 *Invited*

Ultrafast light-induced anomalous Hall conductivity in 3D Dirac semimetal $Co_3Sn_2S_2$

Naotaka Yoshikawa
University of Tokyo

I will talk about the circularly polarized light-induced anomalous Hall conductivity in a 3D Dirac semimetal phase of $Co_3Sn_2S_2$, which is attributed to the band structure modification with the emergent Berry curvature by Floquet engineering.

LSC8-04 12:00 *Invited*

Light-induced collective Higgs and Leggett modes in superconductors

Naoto Tsuji
University of Tokyo

Superconductors exhibit various collective excitation modes such as the Higgs and Leggett modes, reflecting their universal order-parameter dynamics. Recent advances in terahertz laser spectroscopy have enabled their optical observation, highlighting nonlinear and linear interactions with light. In this talk, I will discuss the mechanism of how these collective modes can respond to light.

LSC8-05 12:20

Seeking CE-type antiferromagnetic state in competition with A-type antiferromagnetic state in a layered manganese oxide $LaSr_2Mn_2O_7$

Yasutaka Sawata[1], Goro Shibata[2], Hideki Kuwahara[3], Kenichi Ozawa[4], Hironori Nakao[4], Noriaki Hamada[5,6], Tomohiko Saitoh[1]
[1]Department of Applied Physics, Tokyo University of Science, [2]Japan Atomic Energy Agency, [3]Department of Physics, Sophia University, [4]Photon Factory, Institute of Materials Structure Science, High Energy Accelerator Research Organization (KEK), [5]Department of Physics and Astronomy, Tokyo University of Science, [6]R3 Institute of Newly-Emerging Science Design, Osaka University

$LaSr_2Mn_2O_7$ exhibits complex spin, charge, and orbital ordering. We explored the CE-AFM/A-AFM phase-separated electronic structure in $LaSr_2Mn_2O_7$ and its temperature evolution by a combination of X-ray scattering imaging and micro-focused ARPES.

LSC8-06 12:35

Thermal-Assist Multi-Photon Photoemission in Graphite Photocathodes

Po-Hsun Wu, Yu-Chieh Lo, Yen-Chieh Huang
National Tsing Hua University

We report thermally assisted multi-photon photoemission from graphite with a quantum efficiency of at least two orders of magnitude higher than copper.

LSC-CL 12:50

Closing Remarks

Hiroshi Watanabe
Osaka University

OMC <Room 418>

OMC11-02 11:15

Rapid Analysis of Biomolecules by Light-induced Convection Arising from Nano-bowl Plasmonic Substrate

Takuya Iida[1,2], Ryoma Hasegawa[2,1,3], Masatoshi Kanoda[1,2,3], Shuichi Toyouchi[2,1], Kota Hayashi[2,1,3], Mamoru Tamura[2,4], Shiho Tokonami[2,3]
[1]Department of Physics, Graduate School of Science, Osaka Metropolitan University, [2]Research Institute for Light-induced Acceleration System (RILACS), Osaka Metropolitan University, [3]Department of Materials Science, Graduate School of Engineering, Osaka Metropolitan University, [4]Department of Material Engineering Science, Graduate School of Engineering Science, Osaka University

We demonstrated rapid detection of biomolecules for 5 minutes by optical condensation with mW-level laser irradiation. For example, target DNA were selectively assembled between complementary DNA-modified microparticles by light-induced convection from the plasmonic nano-bowl substrate.

OMC11-03 11:30

Analyzing the dynamics of complex particles in a hybrid trapping system

Souvik Sil, Sophia Friederike Paul, Talib Farziev, Pramitha Praveen Kamath, Viet Giang Truong, Síle Nic Chormaic
Okinawa Institute of Science and Technology (OIST)

We demonstrate the mechanical action of optical and acoustic fields on micron to millimeter-sized particles by trapping them optically or acoustically and interacting them with an evanescent field generated from an optical microfiber.

OMC11-04 11:45

Optical Trapping Controls Supramolecular Assembly and Enantioselective Photocyclodimerization of 2-Anthracenecarboxylic Acid with γ-Cyclodextrin

Yi-Ren Chen[1], Tsung-Wei Shih[1], Cheng Yang[2], Yoshihisa Inoue[3], Teruki Sugiyama[1,4]
[1]National Yang Ming Chiao Tung University, [2]Sichuan University, [3]Osaka University, [4]Nara Institute of Science and Technology

Optical trapping drives the supramolecular assembly of γ-cyclodextrin and 2-anthracenecarboxylic acid (AC) into a higher-order complex, leading to switched regio- and enantio-selectivities in the photocyclodimerization of AC.

----- Lunch 12:00-13:15 -----

OWPT <Room 416+417>

[OWPT9] 11:00-12:15
Session 9
Chair: Masakazu Arai
Univ. of Miyazaki

OWPT9-01 11:00

Muti-junction metamorphic 1064 nm laser power converters

Yudan Gou[1,2], Zhiqiang Mou[1], Di Feng[1], Yongji Chen[3], Jun Wang[1,2]
[1]Sichuan University, [2]Suzhou Everbright Photonics Co., Ltd., [3]Southeast University - Monash University Joint Graduate School

The wavelength of 1064 nm is the main wavelength for long-distance laser wireless power transmission applications. The main factor limiting its development is the performance of the receiving end laser power converters (LPCs). This paper reports the latest progress of the metamorphic buffer layer, tunnel junction, and multi-junction metamorphic 1064nm LPCs.

OWPT9-02 11:15

Development of $CsPb(Br_{0.45}Cl_{0.55})_3$ photovoltaic power converter for blue light optical wireless power transmission

Atsuto Watanabe, Yuejie Tan, Kyohei Goi, Shinsuke Miyajima
Institute of Science Tokyo

$CsPb(Br_{0.45}Cl_{0.55})_3$ photovoltaic converter achieved 1.38% efficiency (Voc = 1.24 V, Jsc = 2.19 mA/cm2) under AM1.5 sun light. Annealing treatment after deposition of $CsPb(Br_{0.45}Cl_{0.55})_3$ significantly improved crystallinity and grain size, enhancing device performance.

OWPT9-03 11:30

Wavelength dependence of incident laser light in a GaInP solar cell with a distributed Bragg reflector for optical wireless power transfer

Yuto Kaneko[1], Ryusei Takahashi[1], Junichi Suzuki[1], Reo Aoyama[1], Moeka Chiba[1], Gin Hirano[1], Ryoga Kakiuchi[1], Kouichi Akahane[2], Shiro Uchida[1]
[1]Chiba Institute of Technology, [2]National Institute of Information and Communications Technology

We investigated the wavelength dependence of the efficiency in GaInP solar cells with DBR, irradiating with 638 nm and 660 nm laser beams. We achieved 48.9 % efficiency under 638 nm irradiation of 3.9 W/cm2.

OWPT9-04 11:45

Laser Irradiation Power Dependency of the Conversion Efficiency of a GaAs Solar Cell with a Distributed Bragg Reflector

Ryoga Kakiuchi[1], Ryusei Takahashi[1], Reo Aoyama[1], Moeka Chiba[1], Junichi Suzuki[1], Gin Hirano[1], Yuto Kaneko[1], Keigo Saito[1], Shiro Uchida[1], Kouichi Akahane[2]
[1]Chiba Institute of Technology, [2]National Institute of Information and Communications Technology

A GaAs solar cell with DBR under 840 nm laser irradiation of 0.7 W/cm^2 showed 55.5% conversion efficiency. At 1.4 W/cm^2 irradiation, the efficiency with DBR was improved by about 1.5% compared to without DBR.

OWPT-CL 12:00

Closing Remarks

Masakazu Arai[1], Motoharu Matsuura[2]
[1]Univ. of Miyazaki, [2]Univ. Electro-Communications

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ALPS <Room 303>

[ALPS-E2] 13:15-14:45
Short wavelength light sources and applications (2)
Chairs: Kentaro Tomita
Hokkaido Univ.
Keisuke Kaneshima
University of Hyogo

ALPS-E2-01 13:15 *Invited*

Technical Challenges in SACLA: toward a Practical X-ray Laser Facility

Takashi Tanaka, Toru Hara, Hitoshi Tanaka
RIKEN SPring-8 Center

As the only XFEL facility in Japan, SACLA has been working as a high-quality x-ray laser source, and many improvements and advancements have been made. In this presentation, technical challenges toward a practical x-ray laser facility are reviewed together with their countermeasures taken in the past years.

ALPS-E2-02 13:45 *Invited*

Intense Extreme Ultraviolet and Vacuum Ultraviolet Radiation Sources for Controlling of Material Surface Contamination

Nozomi Tanaka[1], James Edward Hernandez[1], Yubo Wang[1], Jijun Zhong[1], Yulin Gong[1], K. Nishihara[1,2], A. Sunahara[1,3], T. Johzaki[1,4], Kyung Sik Kang[5], S. Ueyama[6], S. Fujioka[1,7]
[1]Osaka University, [2]Osaka Metropolitan University, [3]Purdue University, [4]Hiroshima University, [5]Samsung Electronics Co.Ltd., [6]Samsung Japan Corporation, [7]National Institute for Fusion Science

We investigated hydrogen radical production in photoionized hydrogen plasma using an intense pulsed XUV source. Laser-induced fluorescence measurements revealed a hydrogen radical density of 4 x 104 cm^{-3}. Enhanced radical production via longer-wavelength vacuum ultraviolet emission is proposed for efficient EUV mirror cleaning.

ALPS-E2-03 14:15

Comprehensive studies of laser-produced tin plasmas for EUV light sources based on measurements of electron temperature and electron density

Kentaro Tomita, Yiming Pan
Hokkaido Univ.

We have developed a joint measurement system of fundamental properties of EUV-light sources (such as EUV energy, spectral profiles, and ion energy distributions), and the plasma parameters (such as electron temperature and density).

BISC <Room 419>

[BISC8] 13:30-14:45
Photoactivation and Optical Diagnostic Systems
Chair: Izumi Nishidate
Tokyo University of Agriculture and Technology

BISC8-01 13:30 *Invited*

Promotion of epidermal differentiation in three-dimensional cultured skin by photobiomodulation

Yasuyuki Tsunoi[1], Masatoshi Furukawa[2], Hiromi Miyazaki[1], Mitsuru Akashi[3], Izumi Nishidate[2], Shunichi Sato[1], Satoko Kawauchi[1]
[1]National Defense Medical College Research Institute, [2]Tokyo University of Agriculture and Technology, [3]Osaka University

We applied photobiomodulation to promote epidermal differentiation in three-dimensional cultured skin. The results showed that photobiomodulation at 823 nm significantly increased the expression of filaggrin, a terminal differentiation marker of epidermal keratinocytes, in the skin.

BISC8-02 14:00

Clinical applications of Raman spectroscopy for minimally invasive surgery and rapid diagnosis

Yusuke Oshima[1,2]
[1]University of Toyama, [2]Oita University

Raman spectroscopy provides numerical information about intrinsic molecules in cells and tissues nondestructively. We developed clinical devices based on Raman spectroscopy for the practical use in real-time diagnosis and during surgery.

BISC8-03 14:15

Alzheimer Severity Classification Using Mod-SE(2) CNN Geometric Deep Learning

Clara Lavita Angelina[1,2], Sunil Vyas[3], Yuan Luo[3,4,5], Hsuan Ting Chang[1,2]
[1]Department of Electrical Engineering, National Yunlin University of Science and Technology, [2]Graduate School of Engineering Science and Technology, National Yunlin University of Science and Technology, [3]Institution of Medical Device and Imaging, National Taiwan University, [4]YongLin Institute of Health, National Taiwan University, [5]Program for Precision Health and Intelligent Medicine, National Taiwan University

Early detection of Alzheimer's disease (AD) is crucial for improving patient outcomes. This study classifies AD severity levels using MRI data and a proposed Mod-SE(2) CNN. The model achieves 90.6% accuracy and 91.3% precision, outperforming other models by effectively addressing spatial variability. Results demonstrate improved classification for early-stage AD's diagnosis.

FAAP <Room 412>

[FAAP5] 13:00-14:40
Session 5
Chair: Toshikazu Ebisuzaki
RIKEN

FAAP5-01 13:00 *Invited*

Non-destructive Evaluation of Produce in Plant Factories with Artificial Light using Spectroscopy: Application to Equipment Maintenance

Taro Fukuyama, Miyuki Ostuka, Keiko Ohashi-Kaneko
Tamagawa University

We developed a non-destructive method to predict alkaloid concentrations in Catharanthus roseus using VIS-NIR spectroscopy. This method could be applied for quality control and equipment maintenance in plant factories with artificial light.

FAAP5-02 13:30 *Invited*

Transformations in Horticulture Systems with the Large-Scale Adoption of Renewable Energy

Tomohiro Jishi
CRIEPI

I will present the use of renewable energy in agriculture, methods of using renewable energy that benefit farmers, the role that plant factories, and the electric power system in farming and fishing villages.

FAAP5-03 14:00

Automated stem detection of Mikania micrantha based on the Hough transform for efficient laser weeding

Yi Lun Li, Yu Pin Lan
National Yang Ming Chiao Tung University

This work presents a novel approach for real-time stem identification of Mikania micrantha. A parallel circuit implemented on a field-programmable gate array (FPGA) significantly accelerates Hough transform computations, enabling rapid and efficient image recognition.

FAAP5-04 14:20

Prevention of Mango Stem-End Rot Using Laser Irradiation

Yudai Iwakiri, Hikari Yoshioka, Kaito Makinose, Okubo Atsuhiro, Masakazu Arai
Miyazaki University

The effectiveness of laser irradiation for preventing stem-end rot of mangoes was investigated. A 100% suppression effect was confirmed by irradiating a 20W optical output, 940nm wavelength laser for 10 seconds, and caused no detectable internal damage.

OMC <Room 418>

[OMC12] 13:15-15:40
Session 10
Chair: Ryuji Morita
Hokkaido University

OMC12-01 13:15 *Invited*

Micro and nanoplastics detection in seawater and complex liquids

Pietro Giuseppe Gucciardi
CNR Istituto Processi Chimico-Fisici

Results on the integration of Raman spectroscopy with Optical and Acoustic Trapping will be shown, aimed at the detection and the chemical analysis of micro and nanoplastics in seawater and complex liquids such as organic digestates.

OMC12-02 13:45

Quantitative phase imaging around water vapor microbubbles under pulsed laser illumination

Kyoshiro Narihira[1], Seiji Fukuhara[1], Naoki Yasuda[1], Keisuke Fujii[2], Kyoko Namura[1], Motofumi Suzuki[1]
[1]Kyoto University, [2]Oak Ridge National Laboratory

Quantitative phase imaging was performed using a pulsed laser with a pulse duration of 3.5 ns to measure the temperature distribution around water vapor-rich bubbles self-oscillating at sub-MHz frequencies.

OMC12-03 14:00

Fabrication of a two-dimensional array of luminescent materials using optical vortex laser-induced forward transfer

Ken-ichi Yuyama[1], A. Srinivasa Rao[2], Takashige Omatsu[2]
[1]Osaka Metropolitan University, [2]Chiba University

We present the micropatterning of luminescent materials by employing optical vortex laser-induced forward transfer. A microlaser array is fabricated by directly printing viscous fluorescent ink, whereas a two-dimensional array of luminescent microcrystalline dots is prepared by printing the precursor solution and subsequent solvent evaporation. A Gaussian beam prevents these stable printing.

OMC12-04 14:15

Chirality-induced optical effects from the viewpoint of the materials' chirality

Akihito Kato, Nobuhiko Yokoshi
Osaka Metropolitan University

To clarify the microscopic origin of chirality-induced optical effect, we develop an analytical method that extracts the chiral part of the Hamiltonian of electronic states.

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TILA-LIC <Room 315>

[TILA-LIC10] 13:30-15:00
Mid-IR sources
Chair: Florent Cassouret
Institute for Molecular Science, Japan

TILA-LIC10-01 13:30 ***Invited***

Advances of solid-state waveguide lasers and microcavity lasers

Feng Chen, Xiaoli Sun, Yuechen Jia, Yang Tan
Shandong University, China

Solid-state micro-lasers are intriguing miniature light sources for diverse applications. We summarize our recent progress on waveguide lasers and microcavity lasers by femtosecond-laser writing and ion implantation based on gain media of laser crystals.

TILA-LIC10-02 14:00 ***Invited***

DFC-PowerChip-Based Multi-Joule Laser Operated up to 50 Hz at Room Temperature

Vincent Yahia[1,2], Arvydas Kausas[2,1], Hideho Odaka[2,1], Takunori Taira[2,1]
[1]Institute for Molecular Science, [2]RIKEN SPring-8 Center

A Distributed Face Cooling (DFC) gain medium has been developed in order to sustain high-energy-density and high-repetition-rate operation at room temperature. Experiments confirmed that DFC can control thermal lensing and thermal birefringence. DFC- PowerChip two-stage amplifier could generate 1J sub-ns pulses at 50Hz and 3.5J at 2Hz.

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ALPS <Room 303>

ALPS-E2-04 14:30

Coherence between a photoelectron and a vibrational wavepacket of D_2^+ induced by an attosecond pulse train

Yasuo Nabekawa, Katsumi Midorikawa
RIKEN center for Advanced Photonics

We analyse the joint energy spectrograms of a photoelectron and a $D+D^+$system generated by the irradiation of a pair of XUV attosecond pulse trains and a sub-10-fs UV pulse.

[ALPS-CL] 15:00-15:15
Closing Remarks
Chair: Hitoki Yoneda
Institute for Laser Science, University of Electro-Communications

BISC <Room 419>

BISC8-04 14:30

Colorectal Cancer Classification Based on Custom MobileNetV2 Deep Learning Model

Quoc-Hung Phan[1], Xuan-Khanh Le[2], Ngoc-Thi Tran[2], Thi-Thu-Hien Pham[3,4], Thanh-Hai Le[5]
[1]NATIONAL UNITED UNIVERSITY, [2]FPT University, [3]International University, [4]Vietnam National University HCMC, [5]The Saigon International University

A novel and custom deep learning models is proposed for colorectal cancer classification based on MobileNetV2 architecture. The results have shown that the proposed technique is able to detect colorectal cancer tissues with an accuracy of 93%. In general, the proposed technique provides a reliable for colorectal cancer detection based on artificial intelligence models.

----- Coffee Break 14:45-15:00 -----

[BISC9] 15:00-16:45
Advanced Imaging and Spectral Imaging
Chair: Manoj Kumar
Amity University Punjab

BISC9-01 15:00

Measuring the neural complexity underlying behavior and consciousness through the integration of entropy and optical microscopy

Dong-Han Li[1], Yin-Tzu Hsieh[1], Jye-Chang Lee[1], Shiu-Feng Cheng[2], Guan-Jie Huang[1], Ann-Shyn Chiang[2,3,4,5,6], Ming-Kai Pan[1,2,7], Shi-Wei Chu[1,2]
[1]National Taiwan University, [2]National Tsing Hua University, [3]Kaohsiung Medical University, [4]National Health Research Institutes, [5]China Medical University, [6]University of California, San Diego, [7]Academia Sinica

To explore neural signal complexity underlying behavior and consciousness, we innovatively integrate entropy analysis and calcium fluorescence microscopy, enabling quantification of brain functional status at individual neuronal level with sub-cellular spatial resolution.

BISC9-02 15:15

White light phase shifting interferometry for quantitative phase imaging of bovine spermatozoa

Harpreet Kaur[1,2], Sunil Bhatt[2], Aman Kumar[3], Sandeep Kumar Jha[4], Satish Kumar Dubey[1], Dalip Singh Mehta[1,2]
[1]Center for Sensors, Instrumentation and Cyber Physical System Engineering (SeNSE), Indian Institute of Technology Delhi, Hauz Khas, New Delhi-110016, India, [2]Bio-photonics and Green-photonics Laboratory, Department of Physics, Indian Institute of Technology Delhi, Hauz-Khas, New Delhi 110016, India, [3]Lala Lajpat Rai University of Veterinary and Animal Sciences (LUVAS), Hisar Haryana-125004, [4]Center for Biomedical Medical Engineering, Indian Institute of Technology Delhi, Hauz Khas, New Delhi-110016, India

The traditional approach to determine the morphology of bovine spermatozoa involves staining the cells. This article employs a label-free quantitative phase microscopy approach to determine the morphological parameters of sperm cells.

FAAP <Room 412>

----- Coffee Break 14:40-15:30 -----

OMC <Room 418>

OMC12-05 14:30

Synchronization of gold nanoparticles in surfactant assisted optothermal trap

Ashutosh Shukla, Rahul Chand, Sneha Boby, Pavan Kumar
Indian Institute of science Education and Research Pune

Surfactants, often present in colloidal suspensions, notably affect the optical trapping of particles. This study explores optothermal trapping of gold nanoparticles in a surfactant solution to show novel trapping dynamics and synchronization of particles' diffusion.

OMC12-06 14:45

Construction of three-dimensional helical structures of nanoparticles using a Laguerre-Gaussian beam

Tatsunori Kishimoto[1], Yasushi Tanimoto[2], Kyoko Masui[2], Chie Hosokawa[2], Kentaro Doi[1]
[1]Toyohashi University of Technology, [2]Osaka Metropolitan University

In this study, we conducted experiments to construct a three-dimensional structure of nanoparticles on a glass surface using a Laguerre-Gaussian (LG) beam. The tip of the structure exhibited directional growth, affected by the orbital angular momentum of the LG beam. These findings are expected to clarify the formation process of chiral nanostructures constructed by LG beams.

OMC12-07 15:00

Optical manipulation of fluorescent nanoparticles bound to lipid membrane by optical vortex

Yasushi Tanimoto, Shunya Moriyama, Kyoko Masui, Chie Hosokawa
Osaka Metropolitan University

We demonstrated that a single nanoparticle on the lipid membrane rotated along the intensity distribution of the optical vortex beam. These results provide insights into the optical manipulation of membrane proteins.

OMC12-08 15:15

Laser refrigeration and anti-Stokes luminescence of Ytterbium-doped YVO_4 and CaF_2 microcrystals

Pawel Karpinski, Kamil Bruchal, Magdalena Dudek, Vitor Paschoal
Wroclaw University of Science and Technology

Laser refrigeration is studied on a single particle level using optical tweezers. The temperature changes are measured using Raman scattering and analysis of the particle's motion. Advanced spectroscopic studies allow to identify competitive mechanisms of laser cooling and heating.

OMC-CL 15:30

Closing Remarks
Takashige Omatsu
Chiba University

Oral, Friday, 25 April PM

TILA-LIC <Room 315>

TILA-LIC10-03 14:30 *Invited*

Temporal shaping in a mid-IR optical parametric oscillator

Edcel Salumbides[1], Youssef Ezzo[1], Oscar Versolato[1,2], Stefan Witte[1,2]
[1]Advanced Research Center for Nanolithography, The Netherlands, [2]Vrije Universiteit Amsterdam, The Netherlands

A coherent mid-infrared source is described, based on a periodically-poled lithium niobate optical parametric oscillator capable of producing arbitrary pulse shapes in the nanosecond regime. By controlling the shape of the 1064-nm pump, we implement pulse shaping of the mid-IR output with tophat temporal profiles. Complex pulse profiles are implemented, which demonstrate temporal shaping versatility.

----- Coffee Break 15:00-15:30 -----

Oral, Friday, 25 April PM

BISC <Room 419>

BISC9-03 15:30

Pea-sized spectrometer capable of mid-infrared passive spectroscopic measurement of body temperature samples

Daichi Anabuki[1], Shiori Tahara[1], Hibiki Yano[1], Ruka Kobashi[2], Yuto Mukaihara[2], Akira Nishiyama[3], Kenji Wada[3], Akiko Nishimura[3], Ichiro Ishimaru[2]
[1]Graduate School of Science for Creative Emergence, Kagawa Univ., [2]Faculty of Engineering and Design, Kagawa Univ., [3]Faculty of Medicine, Kagawa Univ.

We aim to measure blood glucose levels using mid-infrared light emitted by living bodies. In this study, we describe a Pea-sized spectrometer capable of spectroscopic measurement of body temperature samples.

BISC9-04 15:45

Development of a voice coil motor-driven phase shifter for mid-infrared passive spectroscopic imaging

Hibiki Yano[1], Daichi Anabuki[1], Shiori Tahara[1], Ruka Kobashi[2], Yuto Mukaihara[2], Ichiro Ishimaru[2]
[1]Graduate School of Science for Creative Emergence, Kagawa University, [2]Faculty of Engineering and Design, Kagawa University

We have already reported that the proposed method can detect biological components.In order to apply this method to daily life space, we constructed a compact and inexpensive phase shifter using a voice coil motor.

BISC9-05 16:00

Conversion to spectral radiance using Stefan-Boltzmann's law and background correction based on the Planck's law

Yuto Mukaihara[1], Daichi Anabuki[2], Hibiki Yano[2], Shiori Tahara[2], Ruka Kobashi[1], Ichiro Ishimaru[1]
[1]Faculty of Engineering and Design, Kagawa Univ., [2]Graduate School of Science for Creative Emergence, Kagawa Univ.

We have used Planck's law and Stefan-Boltzmann's law to normalise the sensitivity characteristics of spectrometers. Using the two laws as basis functions, we propose a new background correction method for mid-infrared passive spectral imaging.

BISC9-06 16:15

Feature Value of Lactic Acid Outside the Wavelength Peak Using Genetic Algorithm

Yusaku Nakanishi[1], Shota Okada[1], Ruka Kobashi[1], Ayato Norimatsu[1], Hibiki Yano[2], Daichi Anabuki[2], Ichiro Ishimaru[1]
[1]Faculty of Engineering and Design, Kagawa University, [2]Graduate School of Science for Creative Emergence, Kagawa University

Currently, we have successfully measured lactate non-invasively at 8.9 μm. In this report, we present the detection results where feature extraction outside the lactate peak was performed using a genetic algorithm.

BISC9-07 16:30

Multi-prior Physics-enhanced Neural Network for Single-shot Compressed Fluorescence Lifetime Imaging with High Spatiotemporal Resolution

Chen Bai, Xing Li, Siying Wang, Xuan Tian, Runze Li, Tong Peng, Junwei Min, Baoli Yao
Chinese Academy of Sciences

This study presents a single-shot compressed fluorescence lifetime imaging technique using a multi-prior physics-enhanced neural network. It integrates physical model priors, sparsity priors, and others to achieve high-frame-rate and high-resolution imaging, enabling accurate fluorescence lifetime analysis for food safety detection.

FAAP <Room 412>

[FAAP6] 15:30-16:30
Session 6
Chair: Atsushi Shinjo
Keio University

FAAP6-01 15:30

Early Detection of *Diaporthe Destruens* in Sweet Potatoes

Ziyu Wang[1], Riku Matsuzaki[1], Risa Shimooki[2], Yuko Inoue[2], Hiroaki Yoshioka[1], Minoru Takeshita[2], Masaya Miyazaki[3], Yuji Oki[1,4]
[1]Kyushu University, [2]Miyazaki University, [3]HaKal Co. Ltd., [4]SOPT LLC.

Fourier Transform Infrared Spectroscopy (FTIR) and Ultraviolet (UV) fluorescence were utilized to detect early-stage stem rot in sweet potatoes. Observed spectral differences indicate their potential for non-destructive early disease detection.

FAAP6-02 15:50 ***Invited***

The Agriculture Outside the Earth

Toshikazu Ebisuzaki
RIKEN

I will discuss the possibility of the sustainable agriculture outside the Earth in the spacecraft, planets, and asteroids. I will study the availability of H_2O and CO_2, the two raw materials of the photosynthesis of plants and then three major nutrients, N, P, and K, as well as other essential nutrients.

FAAP-CL 16:20

Closing Remarks

Toshikazu Ebisuzaki
RIKEN

Oral, Friday, 25 April PM

TILA-LIC <Room 315>

[TILA-LIC11] 15:30-17:00
TILA-LIC 2025 PLENARY III & closing
Chairs: Takunori Taira
RIKEN SPring-8 Center, Japan
Xavier Mateos
University Rovira i Virgili, Spain

TILA-LIC11-01 15:30 ***Invited***

To be defined
Dieter Hoffmann
Fraunhofer ILT
To be defined

TILA-LIC11-CL 16:30

Closing Remarks

Poster Session <Exhibition Hall A>

Wednesday, 23 April

ALPSp1 10:30-12:00

ALPSp1-01

Nanohardness and Young's modulus of CdSe and CdS nonlinear crystals

Ginka Exner[1], Aleksandar Grigorov[1], Elizabeth Ivanova[1], Valentin Petrov[2], Kentaro Miyata[3]
[1]Plovdiv University Paisii Hilendarski, [2]Max Born Institute for Nonlinear Optics and Ultrafast Spectroscopy, [3]RIKEN Center for Advanced Photonics

The mechanical properties of oriented plates of hexagonal CdSe and CdS were studied by nanoindentation revealing strong anisotropy of the hardness and weak anisotropy of Young's modulus.

ALPSp1-02

Non-Defective Tungsten/Copper Bonding via Laser Surface Modification for Plasma Facing Material Applications

Hiyori Uehara[1,2], Haotian Yang[2], Ryo Yasuhara[1,2], Daisuke Nagata[1], Masayuki Tokitani[1,2], Tomoki Tanaka[3], Takahiro Fujita[3], Keita Suzuki[4], Haruki Kawaguchi[1,2], Chihiro Suzuki[1,2], Reina Miyagawa[1,5], Hiroyuki Noto[1,2]
[1]National Institute for Fusion Science, [2]SOKENDAI, [3]Nippon Tungsten Co.,Ltd., [4]Hokkaido Univ., [5]NITech

For the advancement of plasma facing materials in fusion science, a new joining method of tungsten and copper by introducing laser microfabrication was proposed and demonstrated non-defective bonding.

ALPSp1-03

Comparison of theoretical and experimental picosecond deep ultraviolet laser power generated with $CsLiB_6O_{10}$

Kyosuke Shimada[1], Tomoaki Nambu[2], Ryota Murai[3], Yoshinori Takahashi[3], George Okada[4], Shigeyoshi Usami[1], Masayuki Imanishi[1], Mihoko Maruyama[1], Yusuke Mori[1,3], Masashi Yoshimura[2,3]
[1]Osaka University, [2]Institute of Laser Engineering, [3]SOSHO CHOKO Inc., [4]Spectronix

We compared the theoretical and experimental output power at 266-nm generated using a CLBO crystal. It was found that phase-matching temperature shifts to lower values due to the effect of self-heating.

ALPSp1-04

Preparation of composite films on Al_2O_3–Tb_2O_3 eutectic system by CVD method and their phase compositions and fluorescence properties

Natsumi Imai, Akihiko Ito
Yokohama National University

We prepared composite films in Al_2O_3–Tb_2O_3 eutectic system using CVD method and studied their phase compositions and fluorescence properties.

ALPSp1-05

Eu^{2+}-doped $SrAl_2O_4$ co-doped with Dy^{3+} thick film phosphors prepared by laser-assisted chemical vapor deposition and their photoluminescence properties

Yoshikazu Kanamoto, Akihiko Ito
Yokohama National University

Eu^{2+}-doped strontium aluminate co-doped with Dy^{3+} thick film phosphors were prepared on c-cut sapphire single crystal substrates using laser-assisted chemical vapor deposition.

ALPSp1-06

Sub-40-fs diode-pumped SESAM mode-locked Yb,Y:(Ca,Sr)F_2 laser

Zhen Zhang[1], Zhi-Qiang Li[2], Pavel Loiko[3], Huang-Jun Zeng[2], Ge Zhang[2], Zhang-Lang Lin[2], Simone Normani[3], Alain Braud[3], Fengkai Ma[4], Xavier Mateos[5], Valentin Petrov[6,2], Weidong Chen[2,6]
[1]Synthetic Single Crystal Research Center, Key Laboratory of Transparent and Opto-Functional Inorganic Materials, Shanghai Institute of Ceramics, Chinese Academy of Sciences, [2]Fujian Institute of Research on the Structure of Matter, Chinese Academy of Sciences, [3]Centre de Recherche sur les Ions, les Matériaux et la Photonique (CIMAP), UMR 6252 CEA-CNRS-ENSICAEN, Université de Caen, [4]Department of Optoelectronic Engineering, Jinan University, [5]Universitat Rovira i Virgili (URV), [6]Max Born Institute for Nonlinear Optics and Ultrafast Spectroscopy

We report on a diode-pumped SESAM mode-locked Yb,Y:(Ca,Sr)F_2 laser generating 35 fs pulses at 1056.7 nm with an average output power of 182 mW at a repetition rate of ~65.7 MHz.

ALPSp1-07

Kerr-lens mode-locking of an Yb:$(Lu,Sc)_2O_3$ ceramic laser

Wei Jing[1], Wen-Ze Xue[2], Pavel Loiko[3], Zhang-Lang Lin[2], Huang-Jun Zeng[2], Ge Zhang[2], Xavier Mateos[4], Valentin Petrov[5], Weidong Chen[2,5]
[1]Institute of Chemical Materials, China Academy of Engineering Physics, [2]Fujian Institute of Research on the Structure of Matter, Chinese Academy of Sciences,, [3]Centre de Recherche sur les Ions, les Matériaux et la Photonique (CIMAP), UMR 6252 CEA-CNRS-ENSICAEN, Université de Caen, [4]Universitat Rovira i Virgili (URV), [5]Max Born Institute for Nonlinear Optics and Ultrafast Spectroscopy

We report on a soft-aperture Kerr-lens mode-locked Yb:$(Lu,Sc)_2O_3$ ceramic laser generating 44 fs pulses at 1083.3 nm with an average output power of 420 mW at ~61.5 MHz.

ALPSp1-08

Sub-40-fs SESAM mode-locked Yb,Na:CNGG laser

Huang-Jun Zeng[1], Zhang-Lang Lin[1], Zhongben Pan[2], Pavel Loiko[3], Ge Zhang[1], Xavier Mateos[4], Valentin Petrov[5,1], Weidong Chen[1,5]
[1]Fujian Institute of Research on the Structure of Matter, Chinese Academy of Sciences, [2]School of Information Science and Engineering, Shandong University, [3]Centre de Recherche sur les Ions, les Matériaux et la Photonique (CIMAP), UMR 6252 CEA-CNRS-ENSICAEN, Université de Caen, [4]Universitat Rovira i Virgili (URV), [5]Max Born Institute for Nonlinear Optics and Ultrafast Spectroscopy

We report on a diode-pumped SESAM mode-locked Yb,Na:CNGG laser generating 38 fs pulses at 1062.7 nm with an average output power of 39 mW at ~66.7 MHz.

ALPSp1-09

Crystal growth and evaluation of Te-doped Cs_2HfI_6

Gaito Shimura[1], Chihaya Fujiwara[2]
[1]Saitama University, [2]Tohoku University

Te was doped into Cs_2HfI_6, a red-emitting scintillator, to modify its emission wavelength. Te:Cs_2HfI_6 crystals were grown by the vertical Bridgman method. The emission peak slightly shifted towards longer wavelengths upon Te doping.

ALPSp1-10

Flux growth of Fe-doped Li_2ZnSiO_4 crystal

Eisuke Kamoji
Saitama University

Fe:Li_2ZnSiO_4 crystals were grown from $Li_2B_4O_7$ and $Na_2B_4O_7$ fluxes. The experimental phase diagrams of Li_2ZnSiO_4-$Li_2B_4O_7$ and Li_2ZnSiO_4-$Na_2B_4O_7$ were investigated. The obtained crystals exhibited a red emission at approximately 750 nm.

ALPSp1-11

Diode Laser-based Solid-State Lighting for high Color Rendering Illumination

Dheeraj Kumar, R. K. Varshney, Dalip Singh Mehta
Department of Physics, Indian Institute of Technology Delhi, New Delhi

The demand for high-quality, bright, and accurate lighting is increasing, especially in illumination and communication. Our research introduces a blue laser-based multiple phosphor-converted white light source that closely mimics natural daylight.

ALPSp1-12

Numerical simulation of mid-infrared supercontinuum generation using Tapered Ge-As-Se glass fibers

Zheng Shuyang[1], Musashi Nitta[1], Yusei Takeda[1], Tosei Yoshida[1], Fatemeh Abrishamian[3], Kazuya Takimoto[1], Shinki Nakamura[2], Hiroyasu Sone[1]
[1]Kitami Institute of Technology, [2]Graduate School of Science and Engineering Ibaraki University, [3]Toyama University

We report the results of numerical simulation of mid-infrared supercontinuum generation with an incident wavelength of 4.0μm using Tapered Ge-As-Se fibers, and examine the effects of fiber parameters on the spectral characteristics of supercontinuum generation.

ALPSp1-13

Stable Innoslab laser amplifier with average power beyond 500W

Jinfeng Li, Jie Guo, Xiaoyan Liang
Shanghai Institute of Optics and Fine Mechanics

We report on a high power, stable Yb:YAG Innoslab laser amplifier. An average power of 542 W could be achieved when a 10 W seed was injected and a pump power of 1349 W was applied, with a repetition rate of 200 kHz. Given the absorption of the crystal on pump power is ~70%, the extraction efficiency reaches 57.4%.

ALPSp1-14

100W level ultrafast laser based on an efficient dual-stage periodically placed multi-thin-plates nonlinear pulse compression

Zichen Gao, Jie Guo, Xiaoyan Liang
Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences

We demonstrate a high-power ultrafast source with 96 W average power at 175 kHz, 64 fs pulse duration and excellent beam quality based on an Innoslab amplifier and efficient dual-stage periodically placed multi-thin-plates.

ALPSp1-15

Formation of periodic nanostructures induced by supercontinuum femtosecond laser

Naoki Nishiyama[1], Shinya Naito[1], SeyedAli Rezvani[2], Haruki Kawaguchi[3,4], Hiyori Uehara[3,4], Reina Miyagawa[1,3]
[1]Nagoya Institute of Technology, [2]Santec Holdings Corporation, [3]National Institute for Fusion Science, [4]The Graduate University for Advanced Studies

We investigated the LIPSS formed by Supercontinuum (SC) femtosecond laser. The LIPSS induced by SC light exhibit formation period distribution which is unlike to the LIPSS induced by single-wavelength that has a uniform period distribution.

ALPSp1-16

Development of pulse train laser system for diagnose proton beams with 6-dimensional (v-r) phase space resolution

Genki Onoda[1], Hitoki Yoneda[1], Yurina Michine[1], Hiroyuki Harada[2], Pranab Kumar Saha[2], Ippei Yamada[2], Takanori Shibata[3], Atsushi Sato[4], Michikazu Kinsho[2]
[1]Inst. Laser Sci., Univ. of Electro-Communications, [2]J-PARC/JAEA, [3]KEK, [4]NAT

For precision diagnose of accelerated hydrogen beam, 6-dimensional (space and velocity) space measurement is the final goal. To complete this, we are proposing the method of laser charge exchange with 10-ps pulse train using time-lens.

ALPSp1-17

Coolant effects in a longitudinally excited CO_2 laser with fast pulsed discharge

Yasushi Kodama[1], Kazuyuki Uno[2]
[1]Seidensha Electronics Co.,Ltd., [2]University of Yamanashi

The objective of this study is to investigate the effects of the coolant on fast discharge in a longitudinally excited CO_2 laser, with a particular focus on the effects other than the cooling effect.

ALPSp1-18

Multimode DFBLD Enables WDM Quantum Key Distribution

Gong-Ru Lin, Hsing-Yi Huang, Shih-Chang Hsu
National Taiwan University

A multimode DFBLD is employed as the quantum key carrier for distributing DPS protocol via wavelength-selective phase-injection-locking encoding, which enables 2-Gbit/s DPS-QKD with broadband WDM channel selectivity and large tolerance to wavelength drift.

Poster Session <Exhibition Hall A>

Wednesday, 23 April

ALPSp1 10:30-12:00

ALPSp1-19

Carrier envelope offset detection using supercontinuum generation via high-order soliton pre-compression

Minghe Zhao[1,2], Ruoao Yang[1], Xinyi Chen[3], Haonan Li[3], Honglei Yang[3], Aimin Wang[1], Qian Li[2], Zhigang Zhang[1]
[1]State Key Laboratory of Advanced Optical Communication Systems and Networks, School of Electronics, Peking University, Beijing 100871, China, [2]School of Electronic and Computer Engineering, Peking University, Shenzhen 518055, China, [3]Science and Technology on Metrology and Calibration Laboratory, Beijing Institute of Radio Metrology and Measurement, Beijing 100871, China

We demonstrated efficient supercontinuum generation spanning 1000–2200 nm using cascaded highly nonlinear fibers with distinct dispersion profiles, achieving carrier-envelope offset detection with a signal-to-noise ratio of 35 dB.

ALPSp1-20

207 MHz Dual-Comb Spectroscopic System for Spectral Peaking Measurement

Shotaro Kitajima, Sota Sakaguchi, Norihiko Nishizawa
Nagoya University

A dual-comb spectroscopic system with a fundamental repetition rate of 207 MHz was developed, and dual-comb spectroscopic measurements of the CH4 gas absorption spectral peak at a wavelength of 1.65 μm were performed.

ALPSp1-21

Automated Pulsed Fiber Laser Applied in the Development of an Optical Sensor for Gases Detection

Juan Carlos Hernandez Garcia[1,2], Julian Moises Estudillo Ayala[1], Juan Manuel Sierra Hernandez[1], Jose David Filoteo Razo[3], Olivier Pottiez[4], Eloisa Gallegos Arellano[5], Stephanie Guadalupe Hernandez Garcia[1], Maximino Roberto Tapia Garcia[1], Christian Alexis Salcedo Rodriguez[1], Daniel Alejandro Ramos Gonzalez[1], Roberto Rojas Laguna[1]
[1]Universidad de Guanajuato, DICIS, [2]Investigadoras e investigadores por Mexico SECIHTI, [3]Universidad Autonoma de Tamaulipas, [4]Centro de Investigaciones en Optica A. C., [5]Universidad Tecnologica de Salamanca

We present the use of complex dynamic pulses generated by an automated passive mode-locked laser in the development of an optical sensor for C_2H_2 detection. Results were validated through HITRAN database and the spectral simulation.

ALPSp1-22

Investigation of Pulse Energy Effects on SiC Surface Modification Using Near-Infrared Nanosecond Fiber Lasers

Yi Yang[1], Hsin-Yi Tsai[2], Chien-Fang Ding[1], Yu-Hsuan Lin[2], Kuo-Cheng Huang[2]
[1]Department of Biomechatronics Engineering, National Taiwan University, Taipei, Taiwan, [2]Taiwan Instrument Research Institute, National Applied Research Laboratories, Hsinchu, Taiwan

This study utilized near-infrared nanosecond pulsed fiber lasers to optimize SiC surface modification, analyzing pulse energy's effects on ablation depth and roughness for improved Chemical Mechanical Polishing efficiency.

ALPSp1-23

Demonstration of novel inspection method for sub-millimetre order using Laser-Induced Vibration

Reo Terauchi[1], Katsuhiro Mikami[2], Kenichi Ikeda[3], Yusuke Nakaminami[3], Masanori Otake[3]
[1]Graduate School of Kindai University, [2]Kindai University, [3]Opto Systems Co., LTD.

We demonstrated novel laser-based inspection method for sub-millimetre semiconductor chip fracture. As a result, fracture on chips smaller than 1 mm could be detected.

ALPSp1-24

Fundamental Research for High-Precision Measurement of 2-Beam Self-Coupled Distance and Velocity Sensor

Shoya Sakaguchi, Yuri Yamagishi, Daiki Sato, Daisuke Mizushima, Norio Tsuda
Aichi Institute of Technology

We improve the measurement accuracy of a two-beam self-coupled distance and velocity sensor using two laser diodes by addressing the angle-dependence issues and identifying the optimal range angle to suppress error fluctuations.

ALPSp1-25

Simultaneous Propagation of Femtosecond Optical Laser and X-ray SR Pulses in a Hollow Glass Fiber

Suzumi Kobayashi[1,2], Ryusei Obata[1,2], Aoi Gocho[1,2], Takumi Takata[1,2], Sota Sasakura[1,2], Kenji Tamasaku[2], Keisuke Kaneshima[1,2], Yoshihito Tanaka[1,2]
[1]University of Hyogo, [2]RIKEN SPring-8 Center

We investigated the conditions under which femtosecond optical laser and X-ray SR pulses are simultaneously introduced into a hollow-core fiber, and observed the effects of optical phase modulation in air excited by X-rays.

ALPSp1-26

Development of a portable terahertz source synchronizable with synchrotron X-ray pulses

Shuta Sugeta, Takumi Kyoda, Yoshihito Tanaka, Keisuke Kaneshima
University of Hyogo

We developed a portable terahertz source compatible with synchrotron X-ray pulses. Using a portable femtosecond fiber laser system and a DAST crystal, the system enables terahertz wave generation and detection for combined applications.

ALPSp1-27

Characterization of charge state distributions in near-infrared-wavelength laser-produced tin plasmas for EUV generation

Jang Hyeob Sohn[1], Byoung Ick Cho[1,2]
[1]Department of Physics and Photon Science, Gwangju Institute of Science and Technology, [2]Center for Relativistic Laser Science, Institute for Basic Science

We characterize the charge state distributions of extreme ultraviolet (EUV) light source plasmas produced by near-infrared-wavelength lasers, utilizing radiation-hydrodynamics simulations and non-local thermodynamic equilibrium (NLTE) calculations.

ALPSp1-28

Highly stable THz Waves Using Chaotic Supremacy

Fumiyoshi Kuwashima[1], Mona Jarrahi[2], Semih Cakmakyapan[2], Kenji Wada[3], Masanobu Haraguchi[4], Yuki Kawakami[5], Takeshi Moriyasu[6], Osamu Morikawa[7], Kazuyoshi Kurihara[8], Hideaki Kitahara[9], Takashi Furuya[9], Makoto Nakajima[10], Masahiko Tani[9]
[1]Fukui University of Technology, [2]Electrical and Computer Engineering Department, University of California Los Angeles, [3]Department of Physics and Electronics, Osaka Metropolitan University, [4]Graduate School of Technology, Industrial and Social Science, Tokushima Uitynivers, [5]Department of Electronics and Information Engineering, National Institute of Technology (KOSEN), Fukui College, [6]Faculty of Engineering, University of Fukui, [7]Chair of Liberal Arts, Japan Coast Guard Academy, [8]School of Education., University. of Fukui, [9]Research Center for Development of Far-Infrared Region, University of Fukui, [10]Institute of Laser engineering, Osaka Univ.

Highly stable THz wave using chaotically oscillating laser diode is investigated. Compared it to conventional continuous wave multi-mode semiconductor laser excitation system, about ten times output radio frequency power is increased because of chaotic supremacy.

ALPSp1-29

Analyses of PPLN-based Switches: Pattern Effect of Domain Length Error

Yutaka Fukuchi, Keisuke Kondo, Daiki Shiratori, Ryoichi Miyauchi
Tokyo University of Science

We calculate characteristics of all-optical gate switches using the PPLN devices with consideration for the domain length error. The error causes decrease in the output power. Variation of the error pattern changes the output waveform.

ALPSp1-30

Characteristics of All-Optical 3R Operation Based on QPM-Detuning in PPLNs

Yutaka Fukuchi, Naoto Suzuki, Ryo Sugiura
Tokyo University of Science

We numerically show a possibility of ultra-fast 3R operation of the PPLNs. By detuning the QPM condition, a 200 Gbit/s all-optical 3R function can be expected by using a 1-cm-long PPLN waveguide device.

ALPSp1-31

Noise tolerance evaluation of terahertz single-pixel imaging in reconstructed calculations and mask patterns

Yusuke Odagiri[1], Seigo Ohno[2], Katsuhiko Miyamoto[1]
[1]Chiba university, [2]Tohoku University

Terahertz single-pixel imaging is constrained by a limited array of suitable mask designs, attributable to the limited material options imposed by its longer wavelength. This study simulates an effect of noise on reconstruction calculations and mask patterns to evaluate the variation in noise tolerance.

ALPSp1-32

Objective lens design suitable for femtosecond laser processing

Wei-Jei Peng[1,2], Kun-Huan Wu[1], Ming-Fu Chen[1], Tsung-Xian Lee[3]
[1]Taiwan Instrument Research Institute, National Applied Research Laboratories, [2]Graduate Institute of Applied Science and Technology, National Taiwan University of Science and Technology, [3]Graduate Institute of Color and Illumination Technology, National Taiwan University of Science and Technology

The objective lens is a key component of the femtosecond laser processing. However, commercial objectives often fail to meet the required specifications. In this study, a customized objective is designed and suitable for laser processing.

ALPSp1-33

Digital modulated waveform detection by laser hydrophone using self-coupling effect

Rin Furuya, Norio Tsuda, Daisuke Mizushima
Aichi Institute of Technology

Using a laser hydrophone, the relationship between laser power and bit error rate (BER) was investigated by detecting ultrasonic signals with three types of digital modulation methods: FSK, BPSK, and ASK.

ALPSp1-34

High Efficiency Green Light Emission from InGaN/GaN Quantum Wells via Silver Film Deposition and Visible Light Irradiation

Naoki Ueda[1], Kosuke Fujioka[1], Kenta Mitoda[1], Tetuya Matuyama[1], Kenji Wada[2], Mitsuru Funato[3], Yoichi Kawakami[3], Koichi Okamoto[1]
[1]Osaka Metro. Univ., [2]OMU-ESCARI, [3]Kyoto Univ.

We observed an enhancement in the emission from the InGaN/GaN quantum well following the deposition of a thin Ag film and subsequent irradiation with a visible light laser. The mechanism underlying this phenomenon is discussed.

ALPSp1-35

Fabrication of TiO_2 Metasurface Stickers with a refined sacrificial layer amorphous-GeO_2

Taiki Takashima, TienYang Alex Lo, Shunsuke Murai, Katsuhisa Tanaka
Kyoto University

In this study, we propose a fabrication method for TiO2 nanoantenna stickers using amorphous germanium dioxide (a-GeO2) as a novel water-soluble inorganic sacrificial layer.

ALPSp1-36

Wavelength-Specific Effects of Red and Near-Infrared Laser Photobiomodulation on ADSC Proliferation

Liang-Chieh Chao[1], Hsin-Yi Tsai[1], Wei Wu Li[2,3], Yu-Hsuan Lin[1], Shinn-Zong Lin[2,3]
[1]Taiwan Instrument Research Institute, National Applied Research Laboratories, Hsinchu, Taiwan, [2]Bioinnovation Center, Buddhist Tzu Chi Medical Foundation, Hualien 97002, Taiwan, [3]Department of Neurology, Hualien Tzu Chi Hospital, Hualien 97002, Taiwan

This study utilized 630 nm and 808 nm lasers to irradiate ADSCs, revealing that red light promotes proliferation, whereas near-infrared light inhibits growth, highlighting significance of photobiomodulation in stem cell research.

Poster Session <Exhibition Hall A>

Wednesday, 23 April

ALPSp1 10:30-12:00

ALPSp1-37

Prediction of implant stability for pedicle screw at tapping process by laser resonance frequency analysis

Shogo Hashimoto[1], Katsuhiro Mikami[1], Tetsuya Matsuyama[2], Takuto Hatakeyama[3], Takeo Nagura[3], Daisuke Nakashima[3]
[1]Kindai University, [2]Graduation School of Kindai University, [3]Keio University

Prediction of implant stability for pedicle screw was demonstrated using vibrational spectra at tapping driver from laser resonance frequency analysis.

ALPSp1-38

Observation of antibunching of the fluorescence from a single atom in 87Rb atom array

Yuya Maeda[1,2], Kentaro Shibata[1], Toshiki Kobayashi[2], Makoto Yamashita[2], Shuta Nakajima[2], Rikizo Ikuta[1,2], Takashi Yamamoto[1,2]
[1]Graduate School of Engineering Science, Osaka University, [2]Center for Quantum Information and Quantum Biology, Osaka University

We report on collecting photons from atom array into a single-mode fiber for quantum communication. In the experiment, the value of auto-correlation function $g^{(2)}(0)=0.14\pm0.14$ was obtained, which proves a nonclassical property of the fluorescence.

ALPSp1-39

Hybrid biphoton spectrometer for spectral measurement of visible-NIR entangled photon pairs

Koya Onoda[1], Ozora Iso[1], Masahiro Yabuno[2], Hirotaka Terai[2], Shigehito Miki[2], Ryosuke Shimizu[1]
[1]The University of Electro Communications, [2]National Institute of Information and Communication Technology

We present biphoton spectral measurements in 2D frequency space for non-degenerate photon pairs generated in the visible and telecom bands. The biphoton spectrometer is realized by combining a single-photon imager and a fiber spectrometer.

ALPSp1-40

Self-Injection-Locked Distributed Feedback Laser Diode for Quantum Key Distribution

Pao-Wei Pan, You-Xin Wang, Chu-An Lo, Gong-Ru Lin
National Taiwan University

For the first time, a distributed feedback laser diode is controlled in the self-injection-locking scheme to serve as a single-photon DPS protocol transmitter at 2 Gbit/s for quantum key distribution.

ALPSp1-41

Distance measurement using frequency-calibrated interference spectrum of electro-optic frequency comb

Shunsuke Kamata, Runmin Li, Takashi Kato, Akifumi Asahara, Kaoru Minoshima
The University of Electro-Communications

We demonstrated optical frequency calibration of an optical spectrum analyzer using a mode resolved electro-optic frequency comb and adapted the calibration process to spectral interference distance measurement using an electro-optic comb.

ALPSp1-42

THz Spectroscopy Based on Asynchronous Optical Sampling with Mechanically Shared Dual-Comb Fiber laser

Takumi Takahoshi[1], Ryusei Uchiyama[1], Naoki Takeshi[1], Toshiyuki Miyazaki[1], Kousuke Kubota[1], Takeshi Yasui[2], Shinichi Matsubara[3], Yoshiaki Nakajima[1]
[1]Toho University, [2]Institute of Post-LED Photonics, [3]JASRI

We developed a simple and practical terahertz spectroscopy system based on asynchronous optical sampling using a mechanically shared dual-comb fiber laser. This streamlined spectroscopy system successfully measured the transmission spectrum of a Si-plate.

ALPSp1-43

Study on High-speed Broadband Dual-comb Spectroscopy Schemes Using Dynamic Repetition Frequency Modulation

Mayo Ito, Ruichen Zhu, Takashi Kato, Akifumi Asahara, Kaoru Minoshima
The University of Electro-Communications

Dual-comb spectroscopy is useful for dynamic phenomena utilizing the rapid measurement speed. This study investigates simple and broadly applicable repetition frequency modulation schemes for reducing the dead time in dual-comb spectroscopy.

ALPSp1-44

Development of a Portable Optical Frequency Comb for Open-Path Atmospheric Measurements

Ryo Mitsumoto, Kazumichi Yoshii, Sin-ichi Yamamoto
Ryukoku University

We developed a portable optical frequency comb which can be used outside the laboratory for open-path atmospheric measurements.

ALPSp1-45

100-kHz-class Narrowband Single-stage 11 W EY-doped Fiber Laser Amplifier

Reza Amani[1], Chee S. Goh[2], Kaoru Yamanouchi[3]
[1]Graduate School of Science, The University of Tokyo, [2]Alnair Corporation, [3]The University of Tokyo

We report a single-stage 100-kHz-class narrowband Erbium-Ytterbium (EY)-doped fiber laser amplifier with a high outputpower of 11.1 W and a high gain of 30.4 dB tuneable in a wavelength range of 1540-1570 nm.

ALPSp1-46

Cr^{3+}-Cr^{4+} Ions Valence Transformation Cr,Ca:YAG Transparent Ceramics

Mykhailo Chaika[1,2], Oleh Vovk[3], Pawel Gluchowski[1,2]
[1]Graphene Energy Ltd, [2]Polish Academy of Sciences, [3]Institute for Single Crystals

The kinetics of Cr^{4+} formation was studied by annealing Cr,Ca:YAG ceramics in ambient air under different temperatures at different times, resulting in the transformation of Cr^{3+} to Cr^{4+}. The activation energy of Cr^{3+} oxidation determined by the Jander model was 2.7 ± 0.2 eV, which is in good correlation with the activation energy of oxygen diffusion in the YAG lattice.

ALPSp1-47

OAM Mode Filtering using Spatial Light Modulator and Single-Mode Fiber

Naoki Sugi, Masatada Komine, Takashi Kakue, Ken Morita
Chiba University

Quantum cryptography enables secure communication using entanglement and qubits. Especially, Higher-order photons with orbital angular momentum (OAM) allow high-dimensional encoding. We evaluated OAM states as a preliminary step towards the construction of quantum information communication using the higher-order photon states.

ALPSp1-48

Prediction of Laser Processing Performance by using Machine Learning Method

Keiichiro Toyoshima, Ryotaro Takahashi, Yurina Michine, Hitoki Yoneda
University of Electro-Communications

Real-time prediction of the laser machining process is a key goal for achieving both high-quality and high-efficiency processing. We are currently developing a test machine to realize this concept. In this system, various emission and scattered light signals are monitored to predict the upcoming conditions of the laser machining process.

ICNNQp 10:30-12:00

ICNNQp-01

Ultra-Broadband (Visible to Near-Infrared) Light-Emitting Diodes Based on InP Composited Tetrapod Nanocrystals

C. F. Lai, A. N. Chen, T. C. Tseng, C. W. Liu
Feng Chia University

This study demonstrated the ultra-broadband LEDs based on InP composited tetrapod nanocrystals emitting across visible to near-infrared (430–1600 nm). Synthesized with CdSe, CdS, and ZnS multi-shells, the LEDs achieve 26.2 mW output power under 450 nm excitation. This compact light source is suited for NIR imaging and portable spectroscopy, offering a promising full-spectrum solution for diverse applications.

ICNNQp-02

Light Output Power Enhancement of Deep Ultraviolet LEDs by Three-Dimensional Photonic Crystal Reflective Films

C. F. Lai, T. C. Tseng, A. N. Chen, C. W. Liu
Feng Chia University

This study demonstrated a method to enhance light output power (LOP) of deep ultraviolet (DUV) LEDs using three-dimensional photonic crystal (3D PhC) reflective films. Self-assembled on LED leadframes, the 3D PhC films achieve 73% reflectance at 277 nm, boosting LOP by 30% over conventional gold reflectors. This stable, cost-effective approach improves DUV LED performance and durability for commercial applications.

ICNNQp-03

Study on relaxation mechanism of room temperature polariton condensation in a $CsPbBr_3$ microcavity

Taiki Ogura, Takaya Inukai, Daichi Okada, Shun Takahashi, Kenichi Yamashita
Kyoto Institute of Technology

The mechanism of polariton condensation has not been understood in $CsPbBr_3$ microcavities, a promising research platform for polaritons. In this study, we compare experimental results of polariton condensation to discuss the polariton relaxation mechanism.

ICNNQp-04

Mid-infrared thermo-optical properties of alpha-phase MoO_3 thin films grown by pulsed laser deposition

Roberto Macaluso[1], Alessandro Bile[2], Daniele Ceneda[2], Marco Centini[2], Federico Vittorio Lupo[1], Dominique Persano Adorno[1], Koray Aydin[3], Maria Cristina Larciprete[2]
[1]University of Palermo, [2]Sapienza University of Rome, [3]Northwestern University

Thermo-optical properties of alpha-phase MoO_3 thin films deposited by pulsed laser deposition were carried out in the mid-infrared. Temperature-dependent reflection spectra allowed to retrieve refractive index and extinction coefficient against temperature, and stable and uniquely defined MoO_3 thermo-optical constants such as *dn/dT* and *dk/dT*, which demonstrate the reliability and thermal stability of the realized films for infrared applications.

Poster Session <Exhibition Hall A>

Wednesday, 23 April

ICNNQp 10:30-12:00

ICNNQp-05

Exploring Coherency and Topological Structures in Phonon Fields of D_{3h} Symmetry Materials

Shih-Po Chien, Ting-Hua Lu, Yann-Wen Lan
National Taiwan Normal University

We investigate inhomogeneous lattice vibrations in D_{3h} materials using polarized spectroscopy and phase compensation, demonstrating phonon coherence and proposing methods to generate stable, topologically protected phonon fields for high-density information storage.

ICNNQp-06

Fabrication and dispersion characteristics of polymeric VCSEL with topological structure

Kota Nakajima, Takuya Enna, Yuji Adachi, Daichi Okada, Shun Takahashi, Hideyuki Nakanishi, Kenichi Yamashita
Kyoto Institute of Technology

Cavity polaritons are quasiparticles formed through the strong coupling between microcavity-photons and excitons. This study demonstrates the realization of a one-dimensional Su-Schrieffer-Heeger (SSH) zigzag topological structure within a microcavity. Measurements using Fourier-space imaging revealed a flat band between the s-band and p-band, and modes induced by topological defects were observed.

ICNNQp-07

Design of Bloch surface wave photonic structure for waveguide-type polariton formation

Yushin Karaswa, Daichi Okada, Shun Takahashi, Kenichi Yamashita
Kyoto Institute of Technology

We have designed Bloch surface wave photonic structures in which light can be localized in the active layer.

ICNNQp-08

Enabling Mode-Switchable DPS-QKD with External-Feedback Laser Diode

Chu-An Lo, You-Xin Wang, Gong-Ru Lin
National Taiwan University

An ultra-narrow linewidth DFBLD enables hysteresis wavelength hopping, causing different QBER results by DPS quantum key distribution.

ICNNQp-09

A Novel Phased Quantum Keying with Optically Controlled Wavelength Switching

Yueh-Hsun Yang, Gong-Ru Lin
National Taiwan University

A master-injection-locked slave laser under phased quantum keying scheme can optically serrodyne its photon wavelength via another controller light to switch on/off the DPS-QKD streaming between slave's longitudinal modes dynamically.

ICNNQp-10

Light Outcoupling Enhancement of Quantum-Dot Light-Emitting Diodes Using a Nano-Particle Dispersed Polymer Scattering Layer

Da-Yeon Hyeong, Honyeon Lee
Soonchunhyang University

We enhanced QLED light extraction efficiency by spin-coating a polymer–nanoparticle composite as a light-scattering layer without patterning. Applied to the substrate or beneath the cathode, this layer increased light emission by over 35%.

ICNNQp-11

Bent Fast Quasi-Adiabatic 3-dB Coupler on Silicon

Jiun-Zhu Lai, Shuo-Yen Tseng
National Cheng Kung University

The optimal mode evolution path of bent 3-dB fast quasi-adiabatic couplers is identified. The coupler has a short evolution length of 19.4 μm, with 50±2% splitting ratio over a bandwidth of 235 nm.

ICNNQp-12

Growth and optical/structural characteristics of ZnO:Eu/AlN/GaN heterostructures by metalorganic chemical vapor deposition

Riko Masuda[1], Shuhei Ichikawa[1], Yasufumi Fujiwara[2,1], Masakazu Tane[1], Jun Tatebayashi[1]
[1]The University of Osaka, [2]Ritsumeikan University

We report on the growth and optical/structural characteristics of n-ZnO/ZnO:Eu/AlN/p-GaN heterostructures for p-GaN/AlN/ZnO:Eu/n-GaN herterojunction LED structure in order to improve the optical characteristics of the ZnO:Eu.

ICNNQp-13

Enhancement of Blue Photoluminescence from ZnSe Quantum Dots via Surface Plasmon Resonance Induced by Random Metallic Grain Structures

Haruki Hirauchi, Tomohiko Niwa, Tetsuya Matsuyama, Kenji Wada, Hiroyoshi Naito, Koichi Okamoto
Osaka Metropolitan University

We achieved blue photoluminescence (PL) enhancement of ZnSe quantum dots (QDs) using surface plasmon resonance (SPR) from random metallic grain structures fabricated by a heat treatment of the substrate, showing the potential for efficiency improvement.

ICNNQp-14

Speckle-free Imaging based on Thermally Evaporated Quasi-2D Perovskite Film

Juan Du[1], Sihao Huang[2], Zhengzheng Liu[2]
[1]Hangzhou Institute for Advanced Study, University of Chinese Academy of Sciences, [2]Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences

Quasi-two-dimensional (quasi-2D) perovskites are recognized as ideal gain media for high-performance micro- and nanolaser devices. By using thermal evaporation method, we successfully achieved low-threshold random lasing (10.39 μJ/cm2) and high-quality speckle-free laser imaging with a remarkably low speckle contrast.

ICNNQp-15

Terahertz Broadband Refractive Index Control Using Flexible Silicon Effective Medium

Hidemasa Yamane[1], Yoshiharu Yamada[1], Yusuke Kondo[1], Ken Miyajima[1], Masayuki Fujita[2], Shuichi Murakami[1]
[1]Osaka Research Institute of Industrial Science and Technology, [2]Osaka University

We demonstrate a flexible silicon effective medium with tunable refractive index in the terahertz range. MEMS fabrication enables a spiral spring pattern, allowing mechanical stretchability and refractive index reduction by 8% across 0.6 THz.

ICNNQp-16

The Optical Properties of Oligothiophene Dendron-modified CdS Quantum Dots Based on the Interaction between Ligand and Nanoparticles

Akari Yoshida[2], Masaki Matsubara[1,3], Megumi Suyama[2], Yuma Sakagami[4], Naoki Noda[4], Kentaro Okano[4], Atsunori Mori[4], Atsushi Muramatsu[1,2], Kiyoshi Kanie[1,2]
[1]SRIS, Tohoku University, [2]IMRAM, Tohoku University, [3]National Institute of Technology, Sendai College, [4]Graduate School of Engineering, Kobe University

Oligothiophene dendron-modified CdS quantum dots (QDs) was synthesized. This QDs exhibited the photoluminescence derived from the oligothiophene dendrons. This phenomenon was attributed to energy transfer from the CdS core to the dendron.

SI-Thrup 13:30-15:00

SI-Thrup-01

Spatial Multiplexing of Side-Glow Optical Fibers of Optical Camera based Optical Wireless Communication

Po-Sheng Lin[1], Yung-Jie Chen[1], Yun-Han Chang[1], Chi-Wai Chow[1], Chien-Hung Yeh[2], Li-Chun Wang[1]
[1]National Yang Ming Chiao Tung University, [2]Feng Chia University

We demonstrate using spatial-multiplexing of side-glow-optical-fibers (SGOFs) to increase the data capacity of optical-camera-communication (OCC). 4 SGOFs are put side-by-side using spatial-multiplexing to achieve 13.2-kbit/s.

SI-Thrup-02

Coherence-dependent imaging through a multimode fiber via deep learning

Wataru Watanabe, Yu Nakata
Ritsumeikan University

Deep learning has been used to reconstruct object images through multimode fiber (MMF) from complex speckle images. We investigate image reconstruction quality through MMF based on deep learning.

SI-Thrup-03

Effect of Diffusers in Color Image Reconstruction in Imaging through Scattering Media via Deconvolution Method

Kenta Mizuno, Kenji Osato, Wataru Watanabe
Ritsumeikan University

We demonstrate image reconstruction of color objects behind diffusers via deconvolution method with a monochrome camera. We demonstrate the quality of the reconstructed intensity and wavelength estimation behind the diffuser with different diffusion angles.

SI-Thrup-04

Focused illumination to spatially shifted fluorescent beads by digital phase conjugation and phase modulation using fluorescence light measurement based on the transport of intensity equation

Shiori Matsuda[1,2], Mitsuhiro Morita[3,4], Naru Yoneda[1,3], Osamu Matoba[1,3]
[1]Grad. Sch. System Informatics, Kobe Univ., [2]JSPS, [3]Grad. Sch. Science, Kobe Univ., [4]OaSIS, Kobe Univ.

In this presentation a three-dimensional (3D) fluorescence imaging technique by using the transport of intensity equation (TIE) is applied to generate an efficient illumination to fluorescent beads. When the target object is shifted, the linear phase distribution is added to shift the focused spots. In the experiment, the successful illumination of the spatially shifted target beads was confirmed.

Poster Session <Exhibition Hall A>

Wednesday, 23 April

TILA-LICp 13:30-15:00

TILA-LICp-01

Waveguide laser at 705 nm in Eu:KY(WO$_4$)$_2$ epitaxy

Xavier Mateos[1], Amandine Baillard[2], Jieun Bae[2], Mailyn Ceballos[1], Victor Llamas[3], Pavel Loiko[2], Rosa Maria Solé[1], Magdalena Aguiló[1], Francesc Díaz[1], Gurvan Brasse[2], Patrice Camy[2]
[1]University Rovira i Virgili, [2]Université de Caen Normandie, [3]Eurecat, Centre Tecnològic de Catalunya

The first deep-red europium planar waveguide laser is presented. It consists of a 30-µm thick Eu:KY(WO$_4$)$_2$ layer grown by Liquid Phase Epitaxy. When pumped with green laser at 532 nm, the Eu-waveguide laser delivers a maximum output power of 7 mW at 704.7 nm with a slope efficiency of 9.5%.

TILA-LICp-02

Thermal conductivity of Nd:YSAG, Nd:YGAG, Nd:YAG, and Y_2O_3 ceramics compared to YAG single crystal

Yoichi Sato[1,2], Takunori Taira[1,2], Tomohisa Takemasa[3]
[1]RIKEN SPring-8 Center, [2]Institute for Molecular Science, [3]Konoshima Chemical Co., Ltd.

Thermal conductivities (κ) of Nd:YSAG and Nd:YGAG ceramics were evaluated to 70% of Nd:YAG ceramics. Although Y_2O_3 ceramics has higher κ than YAG ceramics, it was inferior to YAG single crystal below 273 K.

TILA-LICp-03

Improvement of the crystalline orientation control for grains in Yb:FAP ceramics using rotating magnetic flux

Yoichi Sato[1,2], T. Taira[1,2]
[1]RIKEN SPring-8 Center, [2]Institute for Molecular Science

Orientation control in Yb:FAP ceramics was improved from Lotgering factor of 0.02 to 0.99 by eliminating miss-aligned layer. The non-mechanical generator of rotating magnetic flux for slip-casting in the magnetic orientation control was also investigated.

TILA-LICp-04

Augmenting the emission bandwidth by spectrum tailoring in the stacked Nd-doped garnet crystals

Yoichi Sato[1,2], Takunori Taira[1,2]
[1]RIKEN SPring-8 Center, [2]Institute for Molecular Science

Although the optimum design of the spectrum tailoring is too complicated, temperature tuning of gain media brings improved designability. Authors augmented 1.6-nm emission bandwidth of the fluorescence from stacked Nd:garnet crystals up to 6 nm.

TILA-LICp-05

Construction of QPM Quartz Device by Plate Bonding

Hideki Ishizuki[1,2], Yoichi Sato[1,2], Takunori Taira[1,2]
[1]RIKEN SPring-8 Center, [2]Inst. for Mol. Science, NINS

Multi-plate stacking of nonlinear crystal has a possibility for next-generation QPM device fabrication. Plate bonding of crystal quartz was characterized for QPM-quartz device fabrication. Various evaluation of the bonded CQ will be presented.

TILA-LICp-06

Laser damage evaluation for sophisticated material

Akihiro Osanai[1], Takunori Taira[1,2]
[1]RIKEN SPring-8 Center, [2]Institute for Molecular Science

LIDT evaluation and comparison should be performed in same material condition. However, samples which are suitable for measurements cannot be always available. In such cases, we can evaluate the laser damage characteristics after distinguishing several deterioration factors.

TILA-LICp-07

Short and long double pulse TILA for LIBS

Hideho Odaka[1,2], Hwan Hong Lim[3], Takunori Taira[1,2]
[1]RIKEN SPring-8 Center, [2]Institute for Molecular Science, [3]HyTILA

For efficient LIBS, collinear dual-pulse of >MW high peak power sub-ns short pulse for breakdown and 50mJ sub-ms long pulse for higher SN spectroscopy has been successfully generated in a tiny integrated chip-laser.

TILA-LICp-08

Stable high power DFC amplifier for quantum computer

Hideho Odaka[1,2], Baptiste Bruneteau[2], Takunori Taira[1,2]
[1]RIKEN SPring-8 Center, [2]Institute for Molecular Science

The quadruplicate multi-path laser amplification has been demonstrated in DFC-chip for efficient energy extraction due to its negligible thermal birefringence. Finally, we could obtain the better stability of 0.8% for error less quantum entanglement control.

XOPTp 13:30-15:00

XOPTp-01

A dedicated hutch at PETRA III for testing X-ray optics and instrumentation: Developments towards PETRA IV

Nazanin Samadi[1], Niklas Thielen[1], Canrong Qiu[1], Frank Seiboth[2], Xianbo Shi[3], Carlos Sato Baraldi Dias[4], Kai Bagschik[1], Hans-Christian Wille[1], Kathryn Spiers[1]
[1]Deutsches Elektronen-Synchrotron DESY, [2]Center for X-ray and Nano Science CXNS, DESY, [3]Advanced Photon Source, Argonne National Laboratory, [4]Institute for Photon Science and Synchrotron Radiation (IPS), Karlsruhe Institute of Technology (KIT)

The OH2 hutch at the under construction P25 beamline (PETRA III) will focus on X-ray optics testing and innovation, utilizing white and monochromatic beams for wavefront measurement, coherence characterization, and method development. We present pilot results using coded mask wavefront sensing to characterize diamond lens aberrations. OH2 will advance X-ray optics and serve as a development platform for PETRA IV.

XOPTp-02

Hard X-ray, Free Electron Lasers pulse-sharing operations at the European XFEL

Mikako Makita[1], Andreas Koch[1], Antje Trapp[1], Frank Seiboth[2], Nazanin Samadi[2], Trey Guest[1], Harald Sinn[1], Maurizio Vannoni[1]
[1]European XFEL GmbH, [2]Deutsches Elektronen-Synchrotron (DESY)

We present FEL pulse-sharing studies between two neighbouring hard X-ray beamlines, conducted at the European XFEL. Using a few distinct X-ray optics configurations, operational scnearios for parasitic or simultaneous experiments can be realized.

XOPTp-03

Development of ultraprecise multilayer deformable mirrors for adaptive X-ray microscope

Ryota Minamisawa[1], Takato Inoue[1], Sota Nakabayashi[1], Maaya Kano[1], Junya Yoshimizu[1], Yoshiki Kohmura[3], Makina Yabashi[3], Satoshi Matsuyama[1,2,4]
[1]Nagoya University, [2]Osaka University, [3]RIKEN SPring-8 Center, [4]Research Center for Crystal Engineering

To achieve higher resolution of less than 10 nm, adaptive X-ray microscopes with deformable mirrors are promising. Novel deformable mirrors based on a lithium niobate single crystal have enabled shape correction with 0.53 nm accuracy, which is expected to realize adaptive microscopes with sub-10 nm spatial resolution.

XOPTp-04

Visualizing the Eu^{2+}/Eu^{3+} ions in $BaAl_2O_4$ phosphor using TPS 23A X-ray nanoprobe beamline

Yu-Hao Wu[1], Tu-Ngoc Lam[4], Sun-Way Ke[1], Wen-Jay Lee[3], Chien-Yu Lee[1], Bo-Yi Chen[1], Gung-Chian Yin[1], Wan-Zhen Hsieh[1], Ching-Yu Chiang[1], Mau-Tsu Tang[1], Bi-Hsuan Lin[1], E-Wen Huang[2]
[1]National Synchrotron Radiation Research Center, [2]National Yang Ming Chiao Tung University, [3]National Center for High-Performance Computing, [4]Can Tho University

In this study, we used X-ray fluorescence mapping combined with X-ray nanoprobe techniques to visualize the valence states of rare-earth ions. The results reveal that the luminescence intensity of $BaAl_2O_4:Eu^{2+}$ is primarily attributed to the Eu^{2+} activator, and variations in the concentration of Eu^{2+} or Eu^{3+} ions have a negligible effect on the emission intensity.

XOPTp-05

X-ray nanobeam scanner for high-resolution ptychography using Advanced KB mirror and Risley Prism

Kiho Takemura[1], Jumpei Yamada[1], Atsushi Yakushigawa[1], Kota Shioi[1], Gota Yamaguchi[2], Daisetsu Toh[1], Yasuhisa Sano[1], Makina Yabashi[2]
[1]Osaka University, [2]RIKEN SPring-8 Center

We have developed the high-coherent-flux focusing optics with advanced KB focusing mirrors for high-spatial-resolution X-ray ptychography at the upcoming SPring-8-II. We proposed the nanobeam scanner with the Risley prism to achieve high-precision scanning of focused X-ray beams, and successfully deflected 10 keV X-ray beam using two rectangular prisms.

XOPTp-06

Optical design for the SpectroWISE beamline at MAX IV

Louisa Pickworth, Peter Sondhauss, Johan Adell, Andrey Shavorskiy, Robert Temperton, Esko Kokkonen, Erik Mårsell
Lund University

Two new beamlines dedicated to materials science for sustainability have been developed for MAX IV in Sweden, in collaboration with the funding organization WISE (Wallenberg Initiative Materials Science for Sustainability). This paper will present the detailed optical design for the SpectroWISE beamline, enabling HArd X-ray PhotoElectron Spectroscopy (HAXPES), and the associated challenges encountered in the design process.

Poster Session <Exhibition Hall A>

Wednesday, 23 April

XOPTp 13:30-15:00

XOPTp-07

Testing developments of the XDS Oxford - JTEC UHV Bimorph Mirror System

Elliot Jane[1], Luis Mateos[1], Hiroki Nakamori[2], Mourad Idir[3], Lei Huang [3], Tianyi Wang[3], Douglas Smith[1], Will Jones[1]
[1]XDS Oxford, [2]JTEC Corporation, [3]NSLS-II Metrology Group

We present the results of the optical, vibrational and vacuum testing advancements to the UHV compatible silver-bonder PZT bimorph mirror system. The system is comprised of the optic support mount and control system from XDS Oxford and a test substrate provided by JTEC corporation. The design of the optic support system was developed in collaboration with JTEC corporation. Optical testing was undertaken by the NSLS-II metrology team and all other testing at XDS Oxford.

XOPTp-08

Very short focal length space X-ray optics for CubeSats

Ikuyuki Mitsuishi[1], Koki Sakuta[1], Kazuki Ampuku[1], Ryuto Fujii[1], Yusuke Yoshida[1], Makoto Yoshihara[1], Keitoku Yoshihira[1], Ryoma Tanaka[1], Tetsuo Kano[1], Naoki Ishida[1], Wataru Kato[1], Yoshitaka Inoue[2], Keisuke Tamura[3,4], Takashi Okajima[3], Kikuko Miyata[5], Noriyuki Narukage[6], Gota Yamaguchi[7], Shuntaro Mohri[8], Hiroto Motoyama[8], Satoru Egawa[8], Takehiro Kume[9], Yusuke Matsuzawa[9], Yoichi Imamura[9], Takahiro Saito[9], Kentaro Hiraguri[9], Hirokazu Hashizume[9], Hidekazu Mimura[7,8]
[1]Nagoya University, [2]IMV CORPORATION, [3]NASA/GSFC, [4]University of Maryland, [5]Meijo University, [6]National Astronomical Observatory Japan, [7]RIKEN/ SPring-8, [8]The University of Tokyo, [9]Natsume Optical Corporation

We have been developing very short focal length space X-ray optics for future missions through CubeSats and small satellites. We evaluated expected performances and optimized design parameters. We will report our recent status.

XOPTp-09

Development of X-ray imaging spectrometer for the sounding rocket experiment of aurora, LAMP-2.

Makoto Yoshihara[1], Koki Sakuta[1], Kazuki Ampuku[1], Ryuto Fujii[1], Yusuke Yoshida[1], Keitoku Yoshihira[1], Tetsuo Kano[1], Naoki Ishida[1], Wataru Kato[1], Noriyuki Narukage[2], Yoshizumi Miyoshi[3], Kazushi Asamura[4], Yoshitaka Inoue[5], Keisuke Tamura[6], Kikuko Miyata[7], Gota Yamaguchi[8], Shuntaro Mohri[9], Takehiro Kume[10], Yusuke Matsuzawa[10], Yoichi Imamura[10], Takahiro Saito[10], Kentaro Hiraguri[10], Hirokazu Hashizume[10], Hidekazu Mimura[8,9], Ikuyuki Mitsuishi[1]
[1]Nagoya University, [2]NAOJ, [3]Nagoya University/ ISEE, [4]JAXA/ISAS, [5]IMV CORPORATION, [6]NASA/GSFC·University of Maryland, [7]Meijo University, [8]RIKEN, [9]The University of Tokyo, [10]Natsume Optical Corporation

We have been developing an X-ray imaging spectrometer for the sounding rocket experiment of aurora, LAMP-2, to understand interactions between the Earth's atmosphere and space. We have currently been conducting scientific feasibility study and optimizing the design parameters of the instrument.

XOPTp-10

Enhanced Crystal Characterization with Rocking Curve Imaging at BM05 - ESRF

Thu Nhi Tran Caliste
European Synchrotron Radiation Facility (ESRF)

Emerging X-ray Optic devices for synchrotron application, necessitate exceptionally high-quality crystals. To meet these requirements, the Rocking Curve Imaging (RCI) technique implemented at the BM05 beamline has demonstrated its ability to provide precise crystal characterization, offering the required field of view, spatial resolution, and angular resolution.

XOPTp-11

Compact submicron resolution double imaging phase-contrast radiography for pump-probe experiment with XFEL

Tatiana Pikuz[1], Sergey Makarov[2], Bruno Albertazzi[3], Gabriel Rigon[4], Paul Mabey[5], Vasily Zhakhovsky[2], Sergey Dyachkov[2], Nail Inogamov[6], Victor Khokhlov[6], Tommaso Vinci[3], Emeric Falize[7], Olivier Poujade[7], Mario Manuel[8], Gianluca Gregori[9], Victorien Bouffetier[10], Kento Katagiri[11], Gooru Masaoka[11], Hirotaka Nakamura[11], Alexis Amouretti[11], Nicholas Hartley[12], Takeshi Matsuoka[11], Yuichi Inubushi[13,14], Kohei Miyanishi[14], Keiichi Sueda[14], Todashi Togashi[13,14], Toshinory Yabuuchi[13,14], Makino Yabashi[13,14], Alexis Casner[7], Sergey Pikuz[15], Ryosuke Kodama[11,16], Michel Koenig[3,16], Norimasa Ozaki[11,16]
[1]Institute for Open and Transdisciplinary Research in Initiatives, Osaka University, [2]Joint Institute for High Temperatures of RAS, [3]LULI, CNRS, CEA, Ecole Polytechnique, UPMC, Univ Paris 06: Sorbonne Universites, Institut Polytechnique de Pari, [4]Massachusetts Institute of Technology, [5]Department of Physics, Experimental Biophysics and Space Sciences, Freie Universitat Berlin, [6]Landau Institute for Theoretical Physics of RAS, [7]CEA-DAM, DIF, [8]General Atomics, Inertial Fusion Technologies, [9]Department of Physics, University of Oxford, [10]CELLS- ALBA Synchrotron Light Source, [11]Graduate School of Engineering, Osaka University, [12]SLAC National Accelerator Laboratory, [13]Japan Synchrotron Radiation Research Institute, [14]RIKEN SPring-8 Center, [15]HB11 Energy Holdings, [16]Institute of Laser Engineering, Osaka University

Developed the new compact phase-contrast imaging scheme based on the coupling of the sub-micron resolution photoluminescence LiF crystal and scintillator-based x-ray imaging detectors for pump-probe HED experiments with XFEL.

XOPTp-12

4D Observation of Noodle Boiling Process Using High-Speed X-ray Imager 'HAYAKA'

Akio Yoneyama[1], Masahide Kawamoto[1], Midori Yasuda[2]
[1]SAGA Light Source, [2]Nishi-Kyushu Univ.

We used advanced 4D CT imaging with a high-speed X-ray camera 'HAYAKA' to study noodle boiling. The boiling process was simulated by dripping hot water onto the noodles in a rotating straw. The results showed gradual water penetration and bubble formation, with the center remaining al dente after one minute.

XOPTp-13

Three-dimensional structure analysis of a printer toner particle by cryogenic X-ray diffraction imaging tomography

Kosei Harada[1,2], Yuki Takayama[3,2], Masayoshi Nakasako[1,2]
[1]Faculty of Science and Technology, Keio University, Yokohama, Japan, [2]RIKEN SPring-8 Center, Hyogo, Japan, [3]International Center for Synchrotron Radiation Innovation Smart, Tohoku University, Sendai, Japan

Three-dimensional structure of a printer toner particle was reconstructed from a series of diffraction patterns collected by using cryogenic X-ray diffraction imaging tomography at BL29XUL of SPring-8.

XOPTp-14

Development of X-ray two-color multilayer for XFEL nanofocusing mirrors

Arata Iwano[1], Jumpei Yamada[1], Kota Shioi[1], Gota Yamaguchi[2], Daisetsu Toh[1], Yasuhisa Sano[1], Makina Yabashi[2,3]
[1]Osaka University, [2]Riken, [3]JASRI

We have developed the two-color multilayer for 7-nm focused X-ray-pump X-ray-probe (XPXP) measurement. In this presentation, we will report the optimized mirror structure and discuss the required accuracy for multilayer thickness and interface roughness.

XOPTp-15

Arrays of Highly Flexible Coated Hollow Capillaries for Synchrotron Radiation

Jörn Volkher Wochnowski[1], Ryusei Obata[2], Keisuke Kaneshima[2], Yoshihito Tanaka[3]
[1]Technische Hochschule Lübeck, [2]University of Hyogo, [3]RIKEN SPring-8 Center

In this talk, hollow light waveguides functionalised from the inside with High-Z metals are presented as highly flexible X-ray-optics and arrays for synchrotron radiation. The current results obtained at the RIKEN SPring-8 Center are also reported here.

XOPTp-16

Surface finishing of a micro channel-cut crystal monochromator for self-seeding using high-pressure plasma etching

Ryuji Oda[1], Masafumi Miyake[1], Shotaro Matsumura[1], Taito Osaka[2], Makina Yabashi[2,3], Kazuto Yamauchi[4], Jumpei Yamada[1], Daisetsu Toh[1], Yasuhisa Sano[1]
[1]Osaka University, [2]RIKEN SPring-8 Center, [3]JASRI, [4]Osaka University-RIKEN Center for Science and Technology

Lattice-distortion layers in μCCM were effectively removed using high-pressure plasma etching. Distorted surface topography was linked to uneven microscopic interferometric images, suggesting a method for predicting reflected X-ray quality from interferometric measurements.

XOPTp-17

Multi-Beam Optical System for High-Speed X-Ray Tomography Using a Beamsplitter

Wolfgang Voegeli[1], Hiromoto Ando[1], Yoshimasa Sugano[1], Hiroki Yamashita[1], Xiaoyu Liang[2], Ryosuke Ueda[2], Hiroki Sumiishi[2], Tetsuroh Shirasawa[3], Kazuyuki Hyodo[4], Kentaro Kajiwara[5], Wataru Yashiro[2,6]
[1]Tokyo Gakugei University, [2]Tohoku University, [3]AIST, [4]KEK, [5]JASRI, [6]The University of Tokyo

A multibeam optical system for high-speed synchrotron radiation tomography without sample rotation was improved by using a single-crystal beam splitter. Results of a proof-of-principle experiment proving the feasibility of the approach will be reported.

XOPTp-18

Development of simple switchable sample positioning system for soft X-ray microscopy using achromatic total-reflection Wolter mirror

Kyota Yoshinaga[1], Jordan Tyler O'Neal[1,2], Satoru Egawa[1], Kai Sakurai[1,3], Takenori Shimamura[1,2,3], Yu Nakata[1], Yoko Takeo[1,2], Hikaru Kishimoto[3], Yasunori Senba[2,3], Mari Shimura[2,4], Makina Yabashi[2,3], Haruhiko Ohashi[2,3], Takashi Kimura[1,2]
[1]The University of Tokyo, [2]RIKEN SPring-8 Center, [3]Japan Synchrotron Radiation Research Institute, [4]National Center for Global Health and Medicine

We developed a simple switchable sample positioning system with a total-reflection Wolter mirror for a soft X-ray microscope. The system was applied to position biological samples, for which radiation damage is a serious problem.

XOPTp-19

Quantum entanglement state between photoelectron spin and emitted photon polarization in spin and polarization resolved XEPECS of Ti_2O_3

Ryo B. Tanaka, Goro Oohata, Takayuki Uozumi
Osaka Metropolitan University

We theoretically investigated the conditions for the occurrence of quantum entanglement between the spin of photoelectrons and linear polarization of emitted X-ray photons in the $3d \rightarrow 2p$ XEPECS process for Ti_2O_3. We found the occurrence of the spin and polarization entanglement, and the degree of entanglement decreases as the Ti $3d$ - O $2p$ hybridization becomes stronger in terms of the tangle.

XOPTp-21

Improving Energy Resolution of Single-Shot X-Ray Spectrometers Using Detuned Non-Dispersive Multi-Crystal Analyzer

Taito Osaka[1], Yuichi Inubushi[1,2], Takashi Kameshima[1,2], Ichiro Inoue[1], Makina Yabashi[1,2]
[1]RIKEN SPring-8 Center, [2]Japan Synchrotron Radiation Research Institute

We propose and demonstrate a simple way for improving energy resolution of single-shot x-ray spectrometers, employing two channel-cut crystals as the analyzer operating in a detuned non-dispersive geometry.

Poster Session <Exhibition Hall A>

Wednesday, 23 April

XOPTp 13:30-15:00

XOPTp-22

A Fast-X-Ray Reflectivity Setup for sub-second *Operando* Studies of Electrochemical Interfaces

Wieland Corts[1,2], Florian Bertram[3], Sebastian Früchт[1], Xiaokun Ge[1,2], Milena Lippmann[3], Toka Matar[1,2], Hans-Georg Steinrück[1,2]
[1]Forschungszentrum Jülich GmbH - Institute for a Sustainable Hydrogen Economy (INW) - Jülich, Germany, [2]Rheinisch-Westfälische Technische Hochschule (RWTH) - Aachen, Germany, [3]Deutsches Elektronen Synchrotron DESY - Hamburg, Germany

We will present the successful benchmarking of a novel *operando* X-ray reflectivity setup for fast (sub-second) measurements and illustrate different approaches for extracting reflectivity curves from the raw data. Results from *operando* measurements will also be shown.

XOPTp-23

Feasibility study of different frequencies elastography using laboratory X-ray source

Chika Kamezawa[1], Xiaoyu Liang[1], Ren Nasukawa[1], Rinnno Ubukata[1], Yuto Manri[1], Akio Yoneyama[2,4], Wataru Yashiro[1,3]
[1]Tohoku university, [2]SAGA Light Source, [3]The University of Tokyo, [4]KEK

We are developing X-ray elastography to quantitatively assess stiffnes. The elastic modulus is calculated by shear wave propagation from applied vibrations. This report presents a feasibility study of X-ray elastography with different vibration frequencies.

XOPTp-24

Atomic-Level Polishing of X-ray Mirrors using PMMA in Water

Jianli Guo[1], Satoru Egawa[1], Hiroto Motoyama[1], Takuya Hosobata[1,2], Hidekazu Mimura[1,2]
[1]The University of Tokyo, [2]The Institute of Physical and Chemical Research

The WAPOP method developed by the authors achieved atomic-level planarization of silicon with an RMS roughness of 0.5 Å using PMMA in a water-only environment. This technique shows promise for atomic-level processing of X-ray mirrors.

XOPTp-25

Towards Soft X-ray Reflection Ptychography using Long Working Distance Reflection Optics

Yuichi Nagayama, Kai Sakurai, Kyota Yoshinaga, Yu Nakata, Jordan O'Neal, Takenori Shimamura, Yoko Takeo, Takashi Kimura
The Institute For Solid State Physics, The University of Tokyo

Soft X-ray ptychography requires thin and transparent samples for transmission. A proposed reflective optical setup enables analysis of thick and opaque samples, expanding material and surface imaging capabilities.

XOPTp-26

Laboratory 3D X-ray elastography using a lens-coupled high-speed X-ray imaging detector

Rinno Ubukata[1], Chika Kamezawa[1], Xiaoyu Liang[1], Ren Nasukawa[1], Yuuto Manri[1], Akio Yoneyama[2], Wataru Yashiro[1]
[1]Tohoku University, [2]SAGA Light Source

Elastography is a technique for measuring the hardness of objects. In this study, X-ray elastography was performed using a laboratory X-ray source and a lens-coupled high-speed X-ray imaging detector. This technique allows us to flexibly select the field of view, pixel size, spatial resolution, and detection efficiency according to the measurement object.

XOPTp-27

Sub-aperture Stitching Interferometry with Dual Quaternion for X-ray mirrors

Shuai Zhang[1,2,3], Xi Hou[1,2,3], Xiaochuan Hu[1,2,3]
[1]National Key Laboratory of Optical Field Manipulation Science and Technology, Chinese Academy of Sciences, [2]Institute of Optics and Electronics, Chinese Academy of Sciences, [3]University of Chinese Academy of Sciences

In this paper, the basic principle of stitching interferometry is briefly described, and a sub-aperture stitching algorithm based on dual quaternion is proposed. Experiments show that this method has high efficiency and accuracy.

XOPTp-28

Development of scanning-imaging X-ray microscope using advanced Kirkptrick-Baez mirror

Atsuya Nagamatsu[1], Jumpei Yamada[1], Atsushi Yakushigawa[1], Akihisa Takeuchi[2], Kentaro Uesugi[2], Daisetsu Toh[1], Makina Yabashi[2,3], Kazuto Yamauchi[4], Yasuhisa Sano[1]
[1]Osaka University, [2]JASRI, [3]RIKEN SPring-8 Center, [4]Osaka University-RIKEN Center for Science and Technology

Scanning-imaging X-ray microscope (SIXM) is an imaging system that utilizes optics akin to a "line-scan camera". We have developed an SIXM system using total-reflection advanced Kirkpatrick-Baez (AKB) mirrors to achieve high-throughput and achromatic multimodal X-ray images with high spatial resolution. We will report the details of method for improving image quality and about simulation for X-ray fluorescence imaging.

XOPTp-29

Observation of End Milling Phenomena Using Synchrotron X-Ray High-Speed Imaging with a Compact Machining Center

Letian Bai[1], Satoru Egawa[1], Hiroto Motoyama[1], Jianli Guo[1], Takuya Hosobata[1,2], Hidekazu Mimura[1,2]
[1]The University of Tokyo, [2]RIKEN

We observed the milling process by using X-rays with 100 keV in Spring8. This research uccessfully captured the cutting action and vibration pattern of the end mill, as well as the accumulation and flow of chips, even under conditions with coolant present.

XOPTp-30

Development of a Liquid Sample Holder and an Application for Soft-X-ray Ptychography of Living Cells

Kai Sakurai[1,2,3], Yoko Takeo[1], Kyota Yoshinaga[1,3], Jordan Tyler O'Neal[1,3], Yuichi Nagayama[1,3], Yu Nakata[1,3], Takenori Shimamura[1,2,3], Hikaru Kishimoto[2], Yasunori Senba[2,3], Makina Yabashi[2,3], Haruhiko Ohashi[2,3], Mari Shimura[3,4], Takashi Kimura[1,3]
[1]The University of Tokyo, [2]Japan Synchrotron Radiation Research Institute, [3]RIKEN, [4]National Center for Global Health and Medicine

We developed a liquid sample holder and applied it to soft X-ray ptychography using CARROT system at SPring-8 BL07LSU. Additionally, we performed ptychography under different conditions to evaluate the reconstruction of ptychography for liquid samples.

XOPTp-31

X-ray Optics System for Laboratory X-ray Absorption Spectroscopy

Tomomi Ogaki[1], Wenbing Yun[2], Sylvia JY Lewis[2], SH Lau[2]
[1]Canon Marketing Japan Inc., [2]Sigray Inc.

X-ray absorption spectroscopy has been performed using synchrotron radiation facilities, which provide high-brightness X-rays with selectable energies. Recently, due to the X-ray source with the microstructure targets, it became possible to generate X-rays with high brightness and tunable X-ray energy, making it possible to handle a wide energy range. In this study, we will report on the X-ray optics system for laboratory X-ray absorption spectroscopy.

XOPTp-32

Probing the Peculiar Emission Properties of Ce-doped YAG Wafer via XEOL and TR-XEOL of Hard X-ray Nanoprobe

Bi-Hsuan Lin[1], Yi-Chen Li[1], Tzu-Chi Huang[1,2], Yu-Hao Wu[1,3], Wei-Lon Wei[1], Tai-Sing Wu[1], Lo-Yeuh Chang[1], Chien-Yu Lee[1], Bo-Yi Chen[1], Gung-Chian Yin[1], Mau-Tsu Tang[1]
[1]National Synchrotron Radiation Research Center, [2]Department of Chemical Engineering, National United University, Taiwan, [3]Department of Materials Science and Engineering, National Yang Ming Chiao Tung University, Taiwan

In this report, the valent state, emission properties, and decay lifetime of Ce-doped yttrium aluminum garnet ($Y_3Al_5O_{12}$, YAG) wafer have been probed using X-ray absorption (XAS), X-ray excited optical luminescence (XEOL), and time-resolved XEOL (TR-XEOL). These peculiar emission behaviors observed with a hard X-ray nanoprobe may be able to provide important information on quantum technologies and scintillators used in hard X-ray detectors.

XOPTp-33

Hard X-ray Telescope onboard Balloon-borne Polarimeter XL-Calibur

Haruki Kuramoto[1], Hironori Matsumoto[1], Hirokazu Hirokazu[1], Marina Yoshimoto[1], Tomohiro Hakamata[1], Kohei Shima[1], Kentaro Shirahama[1], Aiko Miyamoto[1], Hodaka Kawamura[1], Kaito Murakami[1], Kensuke Uchida[1], Sayana Takatsuka[1], Azuki Nagao[1], Takuya Miyazawa[2], Kazunori Ishibashi[3], Daiki Ishi[4], Yoshitomo Maeda[4], Manabu Ishida[4], Asca Miyamoto[5], Kojiro Tanaka[5], Yusuke Uchida[6], Kazuho Goya[7], Masato Yokota[7], Hiromitsu Takahashi[7], Hisamitsu Awaki[8], Akihiro Furuzawa[9], Takashi Okajima[10], Takayuki Hayashi[10], Henric Krawczynski[11], Fabian Kislat[12], Mark Pearce[13]
[1]Osaka University, [2]Okinawa Institute of Science and Technology, [3]Nagoya University, [4]Institute of Space and Astronautical Science, [5]Tokyo Metropolitan University, [6]Tokyo University of Science, [7]Hiroshima University, [8]Ehime University, [9]Fujita Health University, [10]NASA's Goddard Space Flight Center, [11]Washington University in St. Louis, [12]The University of New Hampshire, [13]KTH Royal Institute of Technology

XL-Calibur, a balloon-borne hard X-ray polarimetry mission features a large effective area telescope (288 cm2 at 20 keV). Its first flight in 2022 failed due to misalignment and we measured the optical axis again. The second flight in July 2024 succeeded in X-ray signal detection from Crab and Cyg X-1 observation. Post-flight measurements confirmed the telescope maintained its performance.

XOPTp-34

The Long-Working Distance and Large Field Of View Transmission X-ray Microscopy at Taiwan Photon Source

Gung-Chian Yin, Bo-Yi Chen, Chien-Yu Lee, Yen-Fang Song, Ming-Ying Hsu, Ying-Shuo Tseng, Shih-Ting Lo, Hsiu-Chien Chan, Tze-Yuan Chen
National Synchrotron Radiation Research Center

This presentation will provide an update on the commissioning status of the TPS 31A2 transmission X-ray microscopy (TXM) system at NSRRC, covering results up to the end of 2024 and early 2025. The TXM is specifically designed for a long working distance of 5 cm and a large field of view (FOV) of 40 × 40 μm.

XOPTp-35

Development of ultrathin deformable mirror for wavelength-independent sub-10nm focusing

Toma Ueyama[1], Takato Inoue[1], Junya Yoshimizu[1], Maaya Kano[1], Ryota Minamisawa[1], Kenta Kanazaki[1], Yoshiki Kohmura[2], Makina Yabashi[2], Satoshi Matsuyama[1,3]
[1]Nagoya University, [2]RIKEN SPring-8 Center, [3]Osaka University

To achieve wavelength-variable sub-10 nm X-ray focusing, we proposed new focusing optics consisting of multiple ultrathin mirrors. In this study, we developed an ultrathin deformable mirror thinner than 100 μm using single-crystal piezoelectric material.

Poster Program

Poster Session <Exhibition Hall A>

Wednesday, 23 April

XOPTp 13:30-15:00

XOPTp-36

Evaluation of high-magnification total-reflection optics for stimulated X-ray Raman scattering imaging using X-ray free-electron laser

Yu Nakata[1,2], Yoko Takeo[1,2], Jordan Taira O'Neal[1,2], Takenori Shimamura[1,2,3], Kyota Yoshinaga[1], Kai Sakurai[1,3], Gota Yamaguchi[2], Shigeki Owada[3], Hikaru Kishimoto[3], Yasunori Senba[2,3], Haruhiko Ohashi[2,3], Makina Yabashi[2,3], Takashi Kimura[1,2]
[1]The University of Tokyo, [2]RIKEN SPring-8 Center, [3]Japan Synchrotron Radiation Research Institute

Our final goal is to achieve stimulated X-ray Raman scattering imaging using an X-ray free-electron laser. To this end, we developed a Wolter Type-III mirror with a high magnification factor.

XOPTp-37

Design of X-ray Nano-Focusing Mirrors Using Curved Crystal Optics

Kento Ogasawara[1], Satoru Egawa[1], Hiroto Motoyama[1], Guo Jianli[1], Takuya Hosobata[1,2], Hidekazu Mimura[1,2]
[1]The University of Tokyo, [2]Riken

The study theoretically examined the diffraction properties, Bragg angles, and Darwin widths of typically used crystal including silicon, germanium, diamond, and quartz, with the objective of facilitating the practical use of an X-ray nano-focusing system utilizing curved crystals.

XOPTp-38

Development of a wide-field-of-view X-ray imaging optical system using total-reflection mirrors

Kosuke Kushida[1], Takato Inoue[1], Haruhito Iriyama[1], Yoshiki Kohmura[4], Makina Yabashi[4], Satoshi Matsuyama[1,2,3]
[1]Nagoya University, [2]Osaka University, [3]Research Center for Crystalline Materials Engineering Graduate School of Engineering, [4]RIKEN SPring-8 Center

We have developed a wide-FOV imaging optical system that can enlarge FOV by reducing field curvature and coma aberrations simultaneously. FOV was increased to 100 μm.

XOPTp-39

X-ray Imaging and Tomography at BL09W in NanoTerasu, a 4th-generation high-brilliance 3 GeV Synchrotron Light Source

Ryosuke Ueda[1], Xiaoyu Liang[1], Chika Kamezawa[1], Hiroki Sumiishi[1], Yui Bishago[1], Takeyasu Nishio[1], Junya Yoshida[1], Masaharu Daimon[2], Shozo Hiramoto[2], Wolfgang Voegeli[3], Tetsuro Shirasawa[4], Wataru Yashiro[1,5]
[1]Tohoku University, [2]Photon Science Innovation Center (PhoSIC), [3]Tokyo Gakugei University, [4]National Metrology Institute of Japan, [5]The University of Tokyo

NanoTerasu, a 4th-generation 3 GeV synchrotron radiation facility, began operations in April 2024. At BL09W, a high-flux white synchrotron beam with energies mainly less than 30 keV can be used for X-ray imaging. This presentation will introduce preliminary results of X-ray grating interferometry and multi-beam tomography without sample rotation.

XOPTp-40

Development of silicon foil X-ray mirrors using hot plastic deformation process

Masaki Numazawa[1], Manabu Ishida[2], Yuichiro Ezoe[1], Ryo Kishikawa[1], Naoya Sera[1], Kumi Ishikawa[1], Yoshitomo Maeda[2], Daiki Ishi[2], Mai Takeo[3], Asca Miyamoto[1], Kohei Morishita[4], Kazuo Nakajima[5]
[1]Tokyo Metropolitan University, [2]Institute of Space and Astronautical Science, Japan Aerospace Exploration Agency, [3]University of Toyama, [4]Kyushu University, [5]Tohoku University

We have been developing silicon foil X-ray mirrors using a hot plastic deformation process for future astronomical observations. Our test mirror achieved 30.9 arcseconds in the best region by optimizing the fabrication process.

XOPTp-41

X-ray Angular Metrology Based on Crystal Dynamical Diffraction

Fugui Yang, Chaoqun Sun, Weifan Sheng, Ming Li, Xiaowei Zhang
Institute of High Energy Physics

Angle measurement is a crucial technique in metrology, serving a significant use in both industrial and scientific domains. X-ray based metrology method can have high performance because of the perfect crystal lattice. In our study, it reports a novel X-ray F-Theta angular measurement method. It utilizes the angular magnification effect of dynamical X-ray diffraction and can reaches sub-nano radian resolution.

Thursday, 24 April

ALPSp2 10:30-12:00

ALPSp2-01

Liquid phase epitaxial growth of Yb- and Tm-doped $MgWO_4$ crystalline films

Xavier Mateos[1], Ghassen Zin Elabedine[1], Rosa Maria Solé[1], Magdalena Aguiló[1], Francesc Díaz[1], Weidong Chen[3], Valentin Petrov[2]
[1]University Rovira i Virgili, [2]Max Born Institute for Nonlinear Optics and Ultrafast Spectroscopy, [3]Fujian Institute of Research on the Structure of Matter, Chinese Academy of Sciences

Single-crystalline layers of $MgWO_4$ doped with Yb^{3+} and Tm^{3+} are grown by the liquid phase epitaxy method on (010) oriented $MgWO_4$ substrates using $K_2W_2O_7$ as a solvent and their morphology is characterized.

ALPSp2-02

Large-Area Moire Metamaterials with Tunable Chirality Using TiO_2 Nanoantenna Sticker

Jiayang He
The University of Kyoto University

Twisted metamaterials are fabricated by stacking achiral nanostructured layers with specific twist angles using nanoantenna stickers, achieving giant circular dichroism at ±22.5°, offering promising applications in chiral optics and advanced sensing technologies.

ALPSp2-03

Luminescence properties of Ce^{3+}-doped yttrium silicate thick films prepared using laser-assisted chemical vapor deposition

Airi Shikichi, Akihiko Ito
Yokohama National University

We prepared Ce^{3+}-doped yttrium silicate films on quartz glass using laser-assisted chemical vapor deposition and investigated its microstructure and luminescence properties.

ALPSp2-04

Parametric Analysis of Mid-Infrared $BaGa_2GeS_6$ Frequency Converters

Kentaro Miyata[1], Kiyoshi Kato[2,3], Nobuhiro Umemura[2], Valentin Petrov[4]
[1]RIKEN, [2]Chitose Institute of Science and Technology, [3]Okamoto Optics, Inc., [4]Max Born Institute for Nonlinear Optics and Ultrafast Spectroscopy

Theoretical analysis reveals $BaGa_2GeS_6$ can outperform $AgGaS_2$ in high-power mid-infrared frequency down-conversion, providing enhanced nonlinearity and broader temperature acceptance through birefringent type-2 phase-matched interaction.

ALPSp2-05

Nonlinear Applications of Mixed Chalcopyrite $AgGa_xIn_{1-x}S_2$ Crystals

Kentaro Miyata[1], Kiyoshi Kato[2,3], Satoshi Wada[1], Valentin Petrov[4]
[1]RIKEN, [2]Chitose Institute of Science and Technology, [3]Okamoto Optics, Inc., [4]Max Born Institute for Nonlinear Optics and Ultrafast Spectroscopy

We developed a new index dispersion model for $AgGa_xIn_{1-x}S_2$ crystals to optimize In-doping in mid-infrared frequency down-conversion applications, enabling enhanced spectral acceptance, reduced spatial walk-off, and improved effective nonlinearity.

ALPSp2-06

Proof of Concept for Green-Pumped Blue Light Generation in BiB_3O_6

Kentaro Miyata[1], Satoshi Wada[1], Valentin Petrov[2]
[1]RIKEN, [2]Max Born Institute for Nonlinear Optics and Ultrafast Spectroscopy

We demonstrate a proof of concept for 430 nm blue light generation in BiB_3O_6 via a self-doubling optical parametric process pumped by 532 nm green light, simplifying traditional multistage nonlinear frequency conversion for industrial applications.

ALPSp2-07

Photoluminescence properties of Strontium Scandate phosphors

Yui Shimizu
Saitama University

Strontium scandates with nominal compositions of $SrSc_2O_4$ and $Sr_3Sc_4O_9$ are investigated as host materials for phosphors. Ce and Eu were used as the activators. Ce:$Sr_3Sc_4O_9$ is reported for the first time in this study.

ALPSp2-08

Synthesis and evaluation rare-earth niobates as a candidate for anisotropic scintillators

Hayato Sato, Shohei Kodama, Ikuo Yanase, Hiroaki Takeda
Saitama University

Scintillator materials with high luminous intensity and light intensity anisotropy are demanded for dark matter detection. We have discovered the possibility of using $Lu_{0.25}Y_{0.75}NbO_4$ as a candidate material for this purpose.

ALPSp2-09

Feasibility study for Czochralski growth of Al_2O_3 using a W crucible

Rintaro Shirai
Saitama University

This study reports the feasibility of crystal growth of Al_2O_3 using the Czhokralski method in a tungsten crucible. Sintered Al_2O_3 was successfully melt and did not react with W in Ar atmosphere.

ALPSp2-10

Mid-Infrared Laser Processing of Plastics and Biological Tissue at 3 μm Wavelength

Hiyori Uehara[1,2], Ryo Yasuhara[1,2], Hirokazu Ishii[3,4], Yuki Watakabe[3,4], Motosuke Tsutsumi[3,4], Kohei Otomo[3,4,5], Tomomi Nemoto[3,4]
[1]National Institute for Fusion Science, [2]SOKENDAI, [3]ExCELLS, [4]National Institute for Physiological Sciences, [5]Juntendo Univ.

Micromachining of plastic and biological tissue was attempted using a compact, high-power mid-infrared Er:YAP solidstate laser (λ=2.92 μm). The processing characteristics depending on the intensity of absorption were clarified.

Poster Session <Exhibition Hall A>

Thursday, 24 April

ALPSp2 10:30-12:00

ALPSp2-11

Gas-filled multi-pass cell with high compression factor of over 22 in millijoule regime

Luqi Guo[1], Jie Guo[2], Xiaoyan Liang[2]
[1]Shanghai Optoelectronics Science and Technology Innovation Center, [2]State Key Laboratory of High Field Laser Physics, Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences

We present an efficient post-compression to 30 fs at 200 W average power based on a gas-filled multi-pass cell (MPC), with a compression factor of over 22, and excellent t beam quality factor of M2~1.3.

ALPSp2-12

Amplitude fluctuation reduction of passively Q-switched lasers by eliminating intermittently Q-switched and mode-locked pulses via spatial hole burning effect

Hsin-Jia Huang[1], Tsung-Hsin Liu[2], Chi-Lien Lin[2], Hsing-Chih Liang[2]
[1]Department of Electrophysics, National Yang Ming Chiao Tung University, [2]Institute of Physics, National Yang Ming Chiao Tung University

We realize a highly stable diode-pumped PQS Nd:YVO_4 laser. Experimental results reveal that reducing the number of longitudinal lasing modes can diminish the intermittently QML and lead to a stability improvement of the Q-switched pulses.

ALPSp2-13

Application of rare-earth-doped transparent ceramics for solar pumping

Kazuya Takimoto[1], Yuto Kiyota[1], Takuma Nomura[1], Hiroki Nakamura[1], Hiroaki Furuse[2], Shinki Nakamura[3], Hiroyasu Sone[1]
[1]Kitami Institute of Technology, [2]National Institute for Materials Science, [3]Graduate School of Science and Engineering, Ibaraki University

Nd-doped fluorapatite (Nd:FAP), a non-cubic transparent ceramic, was exposed to solar light. As a result, emission was confirmed in the 1060 nm and 1320 nm wavelength bands, which are the emission wavelength bands of Nd:FAP.

ALPSp2-14

Development of a 423-nm single-frequency high-power diode laser system for ^{48}Ca isotope separation

Shigeki Tokita[1], Shinichiro Masuno[1], Masahiro Uemukai[2], Izumi Ogawa[3], Hideaki Niki[3], Anawat Rittirong[4], Saori Umehara[4], Sei Yoshida[5], Noriaki Miyanaga[6]
[1]Kyoto University, [2]Graduate School of Engineering, Osaka University, [3]University of Fukui, [4]Research Center for Nuclear Physics, Osaka University, [5]Graduate School of Science, Osaka University, [6]Institute for Laser Technology

We designed a 423-nm single-frequency high-power diode laser system using injection-locked GaN diodes, aiming to achieve >2 W output. The system enables precise ^{48}Ca isotope separation for neutrino-less double beta decay studies, meeting stringent wavelength stability requirements.

ALPSp2-15

Bayesian Optimisation of LWFA with Bessel-Gaussian Beams in FBPIC Simulations

Mehdi Abedi-Varaki[1], Vidmantas Tomkus[1], Valdas Girdauskas[1,2], Tariq Saqlain Sahi[1], Gediminas Račiukaitis[1]
[1]FTMC - Center for Physical Sciences and Technology, Savanoriu Ave. 231, LT-02300 Vilnius, Lithuania, [2]Vytautas Magnus University, K. Donelaicio St. 58, LT-44248, Kaunas, Lithuania

Laser Wakefield Acceleration (LWFA) utilises intense laser-plasma interactions to generate Very High-Energy Electron (VHEE) beams for advanced applications. This study employs Fourier-Bessel Particle-In-Cell (FBPIC) simulations and Bayesian optimisation to increase performance of LWFA driven by a Bessel-Gaussian (BG) laser in a dual-stage gas nozzle, achieving superior beam quality and efficient electron bunch parameter control.

ALPSp2-16

New evaluation method of laser damage problem

Hitoki Yoneda, Yurina Michine
The University of Electro-Communications

High-damage-threshold optics are highly desired for high-energy laser systems. We propose a new damage evaluation method to determine the actual strength of high-energy mirrors under long-term operating conditions.

ALPSp2-17

Observation of Self-Coupled Signals by Micro-Vibration Sensor Using PCSEL

Soya Ishikura, Daiki Sato, Keishiro Goshima, Norio Tsuda
Aichi Institute of Technology University

In this study, we observed the self-coupling signal from a self-coupling micro-vibration sensor using a PCSELs, which has an optical output more than 40 times that of a conventional semiconductor laser.

ALPSp2-18

Q-Switched Rod-Type Ce/Cr/Nd:YAG Ceramic Pulse Lasers

Taku Saiki, Kazuki Yoshida
Kansai University

Rod-type Ce^{3+}/Cr^{3+}/Nd:YAG ceramic pulsed lasers pumped by white light and using Cr^{3+}:YAG saturable absorber were developed. Q-switched laser pulses were obtained. The maximum output energy of 10 mJ with 34 kW peak power was observed.

ALPSp2-19

A proposal of Phase Aperture Kerr-lens mode-locking

Masaki Tokurakawa[1,2], Ayu Konno[1]
[1]University of Electro-Communications,ILS, [2]University of Electro-Communications,CNBE

Here we propose phase aperture Kerr-lens mode locking which is based on π phase shifted aperture. It could enhance modulation depth of KLM lasers enabling much shorter pulse duration and higher power operation.

ALPSp2-20

Gain Characteristics Measurement in Bi-Doped Silica Glass Fiber

Yudai Ishikawa, Chunha Jia, Yasushi Fujimoto
Chiba Institute of Technology

We investigated the gain characteristics of Bi-doped silica glass fiber, which exhibits broadband fluorescence. Significant gain was observed in the wavelength range of 1040–1060 nm, with a maximum gain of 18 times.

ALPSp2-21

Development of Interference-Suppressed Visible Light Laser Source

Kengo Suzuki, Riku Ishizawa, Yasushi Fujimoto
Chiba Institute of Technology

We are developing a visible light source that suppresses optical interference by applying a tunable laser. This study reports on the conditions for interference suppression based on wavelength variation and optical path differences.

ALPSp2-22

Development of a Mid-Infrared Fiber Laser Source Using Rare-Earth-Doped Fluoride Glass Fibers

Junsei Katsuyama, Jo Sumida, Yasushi Fujimoto
Chiba Institute of Technology

We investigated the fluorescence spectrum of Dy^{3+}:WPFG fiber under excitation with an 800 nm LD. Emission spectra were observed in the wavelength range between 2800 and 3300 nm.

ALPSp2-23

Fast detection of spectra by time-encoded supercontinuum vector beam

Yukihiro Inoue[1], Hayato Kobayashi[1], Hiroki Morita[1], Kazuyuki Sakaue[2], Toshitaka Wakayama[3], Takeshi Higashiguchi[1]
[1]Utsunomiya University, [2]The University of Tokyo, [3]Saitama Medical University

To achieve the high-repetition-rate measurement, we detected the rotation angle of polarization and the spectrum by measuring the temporal waveform using a photodetector after expanding the pulse duration of the supercontinuum vector beam.

ALPSp2-24

Characterization of Extreme Ultraviolet light source generated by Two-color High Harmonic Generation for Pump-Probe experiment in Warm Dense Matter Research

Gyusang Lee[1,2], Byoung Ick Cho[1,2]
[1]Department of Physics and Photon Science, Gwangju Institute of Science and Technology, [2]Center for Relativistic Laser Science, Institute for Basic Science

EUV light sources generated via two-color HHG effectively produce even-order harmonics, enhancing spectral resolution and strength for improved nanoplasma diagnostic techniques, particularly EUV absorption spectroscopy.

ALPSp2-25

Development of High Repetition Rate Soft X-ray Lasers Using Tape Targets

Thanh-Hung Dinh[1], Noboru Hasegawa[1], Masahiko Ishino[1], Masayasu Hata[1], Kiminori Kondo[1], Masaharu Nishikino[1], Yuito Nishii[2], Keishin Watanabe[2], Shinichi Namba[2], Ryoma Sato[3], Tsukasa Sugiura[3], Tatsuya Soramoto[3], Takeshi Higashiguchi[3]
[1]National Institutes for Quantum Science and Technology, [2]Hiroshima University, [3]Utsunomiya University

Using a newly developed taper target delivery system, we achieved soft X-ray laser generation in nickel-like Mo and Ag plasmas at a repetition rate of up to 10 Hz.

ALPSp2-26

Recent results of EUV & beyond EUV sources in Utsunomiya University

Takeshi Higashiguchi
Utsunomiya University

We report on the recent progress of extreme ultraviolet (EUV) at 13.5 nm and beyond EUV sources at 6.*x* nm and water-window spectral regions.

ALPSp2-27

Optical Characterization of Uniformity in $Sm_{0.7}Er_{0.3}FeO_3$ single crystal for Room-temperature Terahertz Magnonics

Kohsuke Ataka[1], Kazuki Ikoma[1], Takayuki Kurihara[2], Shinichi Watanabe[1]
[1]Keio University, [2]The Institute for Solid State Physics, The University of Tokyo

We report the growth and characterization of single crystals of $Sm_{0.7}Er_{0.3}FeO_3$, aiming at research in the room-temperature terahertz magnonics. We performed magnetization measurements and polarization imaging and investigated the uniformity of their compositional variations.

ALPSp2-28

Design of spiral phase plate for the Terahertz Vortex Interferometer

Kohei Yamaguchi[1], Yu Tokizane[2], Eiji Hase[2], Takeshi Yasui[2]
[1]Tokushima University, [2]pLED, Tokushima University

In this study, a hollow spiral phase plate was fabricated to construct terahertz vortex interferometer. The method makes it possible to measure opaque objects using terahertz vortices.

ALPSp2-29

Antenna Transmission experiment of a 300GHz wave generated by using a soliton comb

Hitomi Uemura, Takasumi Tanabe, Ayaka Yomoda, Mantaro Imamura, Ryo Sugano, Shun Fujii
Keio University

Terahertz waves enable high-speed, high-capacity communication. This study demonstrates 300 GHz wave generation using a soliton comb in a SiN resonator via power-kicking, stabilized with PDH locking. Two spectral lines were extracted, one OOK-modulated, then photomixed via a UTC-PD. Antenna transmission achieved BER < 10^{-9} at 3 mm and BER 10^{-8} at 22 mm.

Poster Program

Poster Session <Exhibition Hall A>

Thursday, 24 April

ALPSp2 10:30-12:00

ALPSp2-30

Advantages of Soliton Comb as Light Sources in 300 GHz Terahertz Wave Transmission

Kotaro Kawasaki, Takasumi Tanabe, Mantaro Imamura, Ayaka Yomoda, Ryo Sugano, Shun Fujii
Keio University

We demonstrate that a soliton comb outperforms conventional laser sources as a light source for generating terahertz waves in 300 GHz transmission.

ALPSp2-31

Time and Spatially Resolved Analysis of Single Quantum Well InGaN/GaN Photoluminescence Blinking at Multiple Sample Frequencies

Kotaro Oikawa[1], Mitsuru Funato[2], Yoichi Kawakami[2], Ruggero Micheletto[1]
[1]Yokohama City University, [2]Kyoto University

Time-resolved photoluminescence measurements were conducted in InGaN/GaN at different sampling rates and spatial cross-correlation analysis was performed. We found that the correlation is strongly related to crystal structure and is common to all blinking centers.

ALPSp2-32

Linear Polarization Sensitive Monolayer MoS_2 Plasmonic Phototransistor

Chen-Yu Wang[1,2], Jui-Han Fu[3], Wei-Ren Syong[1], Yu-Hsin Kuo[1], Cheng-Han Lin[1,2], Tzu-Yu Peng[1,2], Jia-Wern Chen[1], Feng-Yang Tsai[1,2], Chi-Te Liang[2], Vincent Tung[3], Yu-Jung Lu[1,2]
[1]Academia Sinica, [2]National Taiwan University, [3]The University of Tokyo

We demonstrate highly polarization-sensitive plasmonic phototransistors based on monolayer MoS_2 with an HfN gate and integrated Au nanorod arrays. FDTD simulations optimize the structure for strong linear polarization selectivity under 660 nm illumination.

ALPSp2-33

Surface Modification of Various Compound Semiconductors by Co-Deposition Etching Tchnique and Its Optical Device Applications

Hiyori Uehara[1,2], Quan Shi[1,4], Shin Kajita[4], Hirohiko Tanaka[5], Noriyasu Ohno[5], Ryo Yasuhara[1,2], Hideki Fujiwara[3]
[1]National Institute for Fusion Science, [2]SOKENDAI, [3]Hokkai Gakuen Univ., [4]Tokyo Univ., [5]Nagoya Univ.

Co-deposition etching technique with linear plasma devices has been successfully applied to form a wide variety of nanostructures on various semiconductors. As an example of its optical application, a large-area random laser was demonstrated.

ALPSp2-34

Evaluation of influence laser resonance frequency analysis using pathology image

Satoshi Ikeda[1], Katsihiro Mikami[1], Tasuku Furube[2], Takuto Hatakeyama[2], Satoru Matsuda[2], Daisuke Nakashima[2]
[1]Kindai University, [2]Keio University

Laser Resonance Frequency Analysis (L-RFA) proposed evaluation of tumor stiffness for gastric cancer diagnosis. This study examines the influence of fibrosis depth, analyzed via pathology images, on L-RFA diagnostic scores.

ALPSp2-35

Signal subtraction using two nanosecond pulses with different energies for improved depth resolution in two-photon photoacoustic microscopy

Takashi Kaneko[1], Seiji Maehara[2], Shujiro Hamano[2], Yoshihisa Yamaoka[3], Akira Kimoto[1]
[1]Saga University, [2]TERASAKI ELECTRIC CO., LTD., [3]Komatsu University

Signal subtraction can extract two-photon photoacoustic signals based on the different pulse-energy dependence for one-photon and two-photon photoacoustic signals in two-photon photoacoustic microscopy (TP-PAM). This method enables TP-PAM to improve depth resolution and thickness evaluation.

ALPSp2-36

Transmission of single-photon entanglement in 10 km fiber with dual-band phase stabilization

Eiichiro Kawai[1], Hikaru Shimizu[1], Onon Harata[1], Kazufumi Tanji[1], Rikizo Ikuta[2], Masahiro Takeoka[1,3]
[1]Keio University, [2]Osaka University, [3]National Institute of Information and Communications Technology

We transmitted a single-photon path entangled state through two 10 km fibers. The reference light for phase locking is 5nm apart from the single photons. A visibility of 50.1% was observed after the transmission.

ALPSp2-37

Realization of the Einstein-Podolsky-Rosen correlation from BiBO crystal and its evaluation based on parallel intensity correlation measurements

Kanako Yoshimura[1], Naru Yoneda[1,2], Osamu Matoba[1,2]
[1]Graduate School of System Informatics, Department of System Science, Kobe University, [2]Center of Optical Scattering Image Science, Kobe University

In this paper, the momentum and position entangled photons generated by spontaneous parametric down conversion (SPDC) from BiBO crystal is quantitatively evaluated with the Einstein-Podolsky-Rosen (EPR) correlation. The experimental results violate the uncertainty principle.

ALPSp2-38

Development of highly sensitive spectroscopy technique using dual-comb fiber laser

Naoki Takeshi, Ryusei Uchiyama, Kousuke Kubota, Yoshiaki Nakajima
Toho University

In this study, we aim to perform high-sensitivity spectroscopic measurements using a free-running dual-comb fiber laser. Then, a simple spectral normalization method is used to obtain transmittance spectra for analysis of gas absorption lines.

ALPSp2-39

Generation of a 300-GHz Signal Generation with High Optical Signal-to-Noise Ratio Using an Electro-Optic-Modulation Comb

Yasunori Yoshida, Mitsuki Nakamura, Junia Nomura, Yasuo Minami, Atsushi Ishizawa
Nihon University

We generated a 300-GHz signal with an OSNR exceeding 60 dB using an electro-optic-modulation comb, and achieved a Q-factor of 12.70 with 500 MHz OOK modulation.

ALPSp2-40

Evaluation of a Comb-Mode Linewidth of a Fiber Laser with Intra-Cavity Spectral Broadening

Takuma Yoshioka[1], Ryusei Uchiyama[1], Kousuke Kubota[1], Naoki Takeshi[1], Wataru Kokuyama[2], Yoshiaki Nakajima[1]
[1]Toho university, [2]National Metrology Institute of Japan (NMIJ)/National Institute of Advanced Industrial Science and Technology (AIST)

The spectral linewidth of optical frequency comb modes, with a broadened optical spectrum caused by increased nonlinearity in a fiber laser cavity, was evaluated using the self-delayed heterodyne technique.

ALPSp2-41

Integration of dual-comb spectroscopic polarimetry and single pixel imaging

Shogo Tanimura[1], Eiji Hase[1], Kyuki Sibuya[2], Akifumi Asahara[3], Yu Tokizane[1], Takeo Minamikawa[1,4], Takesi Yasui[1]
[1]Institute of Post-LED Photonics (pLED), Tokushima University, [2]Asai Nursery, [3]Grad. Sch. Info. Engg., Univ. Electro-Commun., [4]Grad. Sch. Engg. Sci., Osaka Univ.

We developed DCSP-SPI to enhance spectro-polarimetric imaging by integrating dual-comb spectroscopic polarimetry and single-pixel imaging. Experimental results using a birefringent test chart demonstrated its potential, with waveform agreement.

ALPSp2-42

Development of highly selective spectroscopy of gas molecules using spectral peak

Yu Ito[1], Shotaro Kitajima[1], Hideki Tomita[1], Hisashi Abe[2], Norihiko Nishizawa[1]
[1]Nagoya University, [2]AIST

Highly selective detection of specific molecular species was demonstrated using pedestal-suppressed spectral peaks generated with a gas-cell-embedded nonlinear loop mirror. CH_4 was successfully detected with high sensitivity and selectivity.

ALPSp2-43

Power scaling of optical frequency comb at 1.4 μm wavelength using fiber Raman amplifiers

Yui Ozawa[1], Shotaro Kitajima[1], Momo Mukai[1], Hideki Tomita[1], Koji Hashimoto[2], Hisashi Abe[2], Norihiko Nishizawa[1]
[1]Nagoya University, [2]AIST

We demonstrated the amplification of spectral peaked and pulsed comb at λ = 1.4 um using fiber Raman amplifier. Maximum gain up to 43.6 dB and maximum power up to 901 mW were successfully obtained.

ALPSp2-44

Development and Stabilization of All-PM Soliton Mode-Locked Dual Comb Fiber Laser Using SWNT Film

Yifei Zhu, Shotaro Kitajima, Norihiko Nishizawa
Nagoya University

We demonstrated an all-PM soliton dual-comb fiber laser using SWNTs, improved stability and precision for spectroscopy applications with a repetition frequency of 70.944 MHz and beat frequency of approximately 250 Hz.

ALPSp2-45

Three-Dimensional Defect Detection using a High-Resolution Optical Imaging System with a Supercontinuum Generation-Based Laser Source

Heng-Tsung Cheng[2], Meng-Tsan Tsai[1,2]
[1]Department of Electrical Engineering/Chang Gung University, [2]Department of Biomedical Engineering/Chang Gung University

Advances in optical imaging systems have significantly enhanced the capability to detect three-dimensional defects in materials and structures with high precision. The use of supercontinuum lasers provides broad spectral output, enabling better contrast and resolution for identifying microstructural defects. In this study, the developed system is further applied for nondestructive inspection of multi-layer structure for detection of defects.

ALPSp2-46

Radial-Balanced Phase Transfer Functions for Accurate Retrieval in Quantitative Differential Phase Contrast Microscopy

Cheng Yu, ChingEn Lin, Sunil Vyas, HaoPin Chiu, Yuan Luo
National Taiwan University

This study proposes an illumination pattern for qDPC to improve phase retrieval by achieving a radially balanced PTF. Simulations and experiments validate its accuracy.

ALPSp2-47

FPGA-Based Single-Photon Coincidence Measurement System

Masatada Komine, Naoki Sugi, Kaito Terashima, Masato Shotoku, Tomoyoshi Shimobaba, Takashi Kakue, Ken Morita
Chiba University

A system for the coincidence detection of photons is essential for the demonstration of quantum entanglement between photons and the detection of single photons. We have constructed a low-cost coincidence detection system using an FPGA.

ALPSp2-48

Atmospheric-Pressure-Plasma Assisted Laser Machining for Glass Cutting

Ryotaro Nakashima, Yurina Michine, Hitoki Yoneda
The University of Electro-Communications

Transparent glass machining needs deep UV laser or high intensity laser to obtain high absorption condition. To overcome this problem, we develop plasma assisted method for laser cutting of glasses.

Poster Session <Exhibition Hall A>

Thursday, 24 April

OPTMp 10:30-12:00

OPTMp-01

Microscopic Defect Detection of Thin Films Based on Deep Learning and Knowledge Distillation Method

Chuen-Lin Tien[1], Hsiang-Hsun H. Tsai[2], Hsi-Fu Shih[2]
[1]Feng Chia University, [2]National Chung Hsing University

This study focuses on the detection of microscopic thin-film defects by integrating deep learning and knowledge distillation techniques. We propose an efficient and practical solution to detect microscopic thin-film defects. Thin film microscopic defects are classified into five categories: particles, pinholes, speckles, scratches, and cracks. The results achieve an accuracy of 99.5% for crack and 84% for particle.

OPTMp-02

Approaches to Seafloor Image Identification Using Laser Reflected Light

Takamitsu Okada[1], Shojiro Ishibashi[2]
[1]Mitsubishi Electric Defense and Space Technologies Corporation, [2]Japan Agency for Marine-Earth Science and Technology

To explore seafloor resources, we developed a multi-input integrated CNN that identifies the seafloor using measurement images from a dual-wavelength laser scanner. We conducted identification experiments in deep-sea environments and confirmed the effectiveness of the method.

OPTMp-03

Adjustable Sensitivity Measurement Device for Liquid Concentration Detection

Kun-Huang Chen[1], Yao-Yuan Chang[1], Siao-Yu Chang Jian[1], Jing-Heng Chen[2], Sheng-Chun Hung[1]
[1]Department of Electrical Engineering, Feng Chia University, [2]Department of Photonics, Feng Chia University

This study proposes a surface plasmon resonance (SPR) heterodyne interferometer with adjustable sensitivity for liquid concentration measurement. The design of this structure mainly consists of a heterodyne interferometer, a surface plasmon resonance (SPR) sensor, and a phase modulator. The proposed method has advantages of a simple structure, ease of operation, high accuracy, high resolution, and resistance to external disturbances.

OPTMp-04

Batch reading and decoding method and deep learning technique for holographic memories

Jialin Zhang[1], Changqiu Yu[2], Hironori Ito[3], Satoshi Honma[3]
[1]Hangzhou Dianzi University and Yamanashi University, [2]Hangzhou Dianzi University, [3]Yamanashi University

We propose a deep learning-based decoding system for spatial quadrature amplitude modulation (SQAM) signals for holographic memory systems. This method directly decodes SQAM signals from interference intensity distributions formed by three SQAM signals.

OPTMp-05

Optical design of a high color rendering LED lamp with a donut-shaped light pattern

Chih-Ling Sheu[1], Tsung-Xian Lee[2], Shih-Hsin Ma[1]
[1]Feng Chia University, [2]National Taiwan University of Science and Technology

A high color rendering LED luminaire composed of an annular white light emitting surface and an annular TIR lens is proposed to be useful in applications such as fill lighting or side illumination of cylindrical objects.

OPTMp-06

Design of a Novel Optical System for a Laser Tracking Interferometer

Fan-Hsi Hsu[1], Ting-Han Chen[2], Guan-Syuan Yu[2], Yu-Ta Chen[2]
[1]National United University/ Department of Electro-Optical Engineering, [2]National Formosa University/ Department of Mechanical Design Engineering

Laser tracking interferometers ideally achieve nanometer-level accuracy in measuring distance differences. However, in conventional systems, dual-axis rotation mechanisms and the laser beam axis remain susceptible to mechanical and assembly errors, resulting in measurement inaccuracies. As a result, this study addresses these challenges by redesigning critical reflective mirrors.

OPTMp-07

Laser measurement of high-speed displacement using intensity correlation between probe and phase-modulated reference signals

Daiki Kawase, Yoshihiro Endo, Yosuke Tanaka
Tokyo University of Agriculture and Technology

The displacement measurement of a high-speed moving object was investigated in our proposed laser measurement system. The proof-of-concept experiment confirmed the potential to measure the displacement of an object moving at 1 m/s.

OPTMp-08

Multi-depth Structured Illumination Lens-free Digital Holography

Huai-Che Chu[1], Chung-Hsuan Huang[1], Chau-Jern Cheng[1], Han-Yen Tu[2]
[1]National Taiwan Normal University, [2]Chinese Culture University

This study presents a novel method for multi-depth structured illumination lens-free digital holography to effectively capture higher spatial frequencies for significantly resolution enhancement. The simulation results show the feasibility of the proposed method.

OPTMp-09

Optimization of Cup Grinding Wheel Cutting Parameters Using Machine Learning Surrogate Models

Yen-Han Chiang[1], Chien-Yao Huang[2], Chung-Ying Wang[2]
[1]National Center for High-performance Computing, [2]Taiwan Instrument Research Institute

Develop a cup grinding wheel optimization system using machine learning-based surrogate models and heuristic algorithms to predict surface quality and optimize parameters, achieving higher efficiency, improved surface quality, increased material removal, and reduced energy consumption.

OPTMp-10

Advancing Cup Grinding Wheel Monitoring: 3D Interactive Visualization for Flaw Detection via Laser Profile Data

Chung-Ying Wang, Jun-Cheng Chen, Shu-Cheng Shyu, Chien-Yao Huang
Taiwan Instrument Research Institute

This study presents a 3D interactive visualization tool using laser-measured grinding wheel profiles to identify flaws and wear patterns, enhancing real-time monitoring, decision-making, and paving the way for AI-driven analysis in future applications.

OPTMp-11

Parallel long-focusing femtosecond laser pulses for processing thick diffraction grating

Koichi Takahashi, Yoshio Hayasaki
Center for Optical Research and Education (CORE), Utsunomiya University

A thick diffraction grating is a transparent optical device with a periodical refractive index change in three dimensions. The feature is high diffraction efficiency in the specific wavelength at the range of the incident angle that satisfies the Bragg condition. In this study, parallel long-focusing femtosecond laser pulses are first demonstrated for high throughput fabrication.

OPTMp-12

Development of a lamp-up photodetector for underwater laser scanner

Yutaka Hasegawa[1], Hiroshi Morishita[1], Takamitsu Okada[2], Takashi Saito[3], Shojiro Ishibashi[4]
[1]HAMAMATSU PHOTONICS K.K., [2]Mitsubishi Electric Defense and Space Technologies Corp., [3]Tamagawa Electronics CO., LTD., [4]Japan Agency for Marine-Earth Science and Technology

We developed the MCP-PMT(Microchannel plate photomultiplier tube) with RAPU(Ramp up power supply unit) for the underwater laser scanner. The gain of the MCP-PMT can be changed from 1x103 to 1x106 in a time span of 400 ns.

OPTMp-13

Design of a Large Aperture High-Resolution Fisheye Lens for Automotive Surround-View Systems

Fan Ru Lin[1,2], Shang-Ru Yang[1,2], Chih-Yung Hsiao[1], Pai-Hung Chien[1], Wei-Chia Su[2]
[1]Calin Technology Co., Ltd, 24, Chien Kuo Rd., [2]National Changhua University of Education.

This paper presents the design of a high-resolution ultra-wide-angle fisheye lens for automotive surround-view cameras, featuring a 195° horizontal FOV, F-thea distortion<10%, F-number>2, and meeting automotive standards.

OPTMp-14

Application of High-Resolution Large Aperture Wide-Angle Lenses in Advanced Automotive Vision Systems

Shang-Ru Yang[1,2], Fan-Ru Lin[1,2], Chih-yung Hsiao[1], Pai-Hung Chien[1], Wei-Chia Su[2]
[1]Calin Technology Co., Ltd, 24, Chien Kuo Rd., [2]National Changhua University of Education

The lens is designed to detect road conditions ahead using a wide-angle lens with a 120° horizontal field of view. Its F-number 1.6 aperture ensures excellent resolution.

OPTMp-15

Non-destructive Inspection on the Coatings of Interior Decoration with Multispectral Imaging Module

Po-Li Chen, Rui-Cian Weng, Da-Ren Liu
Taiwan Instrument Research Institute, National Applied Research Laboratories

The coatings used in indoor building materials is closely related to the health of the residents and the global environment. In order to quickly and easily identify the composition of coating samples on indoor building materials, this study utilizes a multispectral imaging module with different light sources from wavelength 400 nm to 1000 nm to detect transmittance, reflectance, and characteristic fluorescence in different wavelength bands.

Poster Session <Exhibition Hall A>

Thursday, 24 April

BISCp 13:30-15:00

BISCp-01

The Indicator Standardization of Late EPCs Transwell Migration Assay by the YOLO Algorithm

Chen-Ju Lee, Ching-Ching Yang, Tsung-Yu Li, Liang-Chieh Chao, Hsin-Yi Tsai, Yu-Hsuan Lin, Kuo-Cheng Huang
Taiwan Instrument Research Institute

Late endothelial progenitor cells (late EPCs) are crucial for angiogenesis and endothelial repair. While the Transwell Migration Assay assesses their migration ability, manual cell counting is subjective, time-consuming, and labor-intensive. This study uses image stitching and the YOLO algorithm to standardize late EPC Transwell Migration Assays, improving efficiency, accuracy, and reducing labor costs.

BISCp-02

Classification of microplastics in living organisms using a color polarization camera

Ryuto Hakoda, Yukitoshi Otani
Utsunomiya University

Marine microplastic's pollution is a growing concern. Microplastics, smaller than 5micro meters, are ingested by marine life and can harm humans through the food chain. To address this, we aim to classify microplastics in organisms using a color polarization camera. Using circularly polarized light and a snapshot-based method, our approach is simpler and more cost-effective than previous research.

BISCp-03

Invasion depth estimation of gastric cancer in early stage using circularly polarized light scattering: Phantom studies

Mike Raj Maskey[1], Mitsuo Fukuno[1], Akane Saito[1], Asato Esumi[1], Takahiro Kuchimaru[2], Nozomi Nishizawa[1]
[1]Kitasato University, [2]Jichi Medical University

Invasion depth estimation of gastric cancer using circularly polarized light scattering have been investigated. The optical phantoms containing polystyrene beads and UV-cured resin were taken by a circular polarization imaging camera.

BISCp-04

Machine learning of morphological parameters of red blood cells and blood coagulation structures in flow cytometry using digital holographic microscopy

Taiki Sasaki, Hideki Funamizu
Muroran Institute of Technology

Digital holographic microscopy is one of the effective methods for quantitative phase imaging and plays an important role in bioimaging, such as measuring the thickness or refractive index of biological cells and cell morphology. In this study, we demonstrate the machine learning of morphological parameters of red blood cells and blood coagulation structures in flow cytometry using digital holographic microscopy.

BISCp-05

Spatial resolution properties of deconvolution filters in digital holographic microscopy using speckle illumination

Saya Kunieda, Hideki Funamizu
Muroran Institute of Technology

In the resolution enhancement of digital holographic microscopy using speckle illumination, the image contrast of the reconstructed images decreases because the amplitude transfer function in the optical system is modulated by speckle illumination. In this study, we report the spatial resolution properties of deconvolution filters in digital holographic microscopy using speckle illumination.

BISCp-06

High-speed thermal imaging of an object interior using the infrared point detector of an MCT sensor

Masaki Hisaka
Osaka Electro-Communication University

We performed a basic internal temperature measurement using an infrared point MCT detector with a view to developing a non-contact high-speed method for measuring the human core temperature.

BISCp-07

Raman spectroscopy for detecting differences in molecular composition among subtypes of FFPE invasive ductal carcinoma tissue

Chihiro Matsumoto[1], Koji Arihiro[2], Ken-ichi T Suzuki[3], Yusuke Oshima[1,4,5,6]
[1]Graduate School of Pharma-Medical Sciences, University of Toyama, Faculty of Engineering, [2]Department of Anatomical Pathology, Hiroshima University Hospital, [3]Emerging Model Organisms Facility, Trans-scale Biology Center, National Institute for Basic Biology, [4]Faculty of Engineering, University of Toyama, [5]Research Center for Pre-disease Science, University of Toyama, [6]Oita University Faculty of Medicine

We elucidate differences in proteins and lipids within FFPE tissues of invasive ductal carcinoma, primarily based on the presence or absence of lymphocytic infiltration, using Raman spectroscopy.

BISCp-08

Innovative Synthesis and Functionalization of Cu and AuCu Nanoparticles for Enhanced SERS and Catalytic Applications

Mei-Yi Liao
National Pingtung University

This study developed stable Cu nanoparticles with strong SERS enhancements (EM: 1.5 x 10^3, CM: 3.6 x 10^4). Au incorporation created 7–75 nm AuxCuy nanoparticles with tunable Cu/Au ratios (5/95 to 29/71). Larger AuxCuy particles showed SERS up to 1.4 x 10^4, and Au-S bonds raised CM to 5.5 x 10^4. This method supports applications in sensing, nanozymes, cancer therapy, and molecular detection.

BISCp-09

Synergistic Photodynamic and Metabolic ROS Modulation of glycosylated Au nanoparticles

Chih-Chia Huang
National Cheng Kung University

Reprogramming tumor-associated macrophages to M1 phenotypes faces toxicity challenges. This study introduces a galactose-functionalized Au-S/polyaniline nanoparticle (Au@2ATP@PG NP) for safer ROS generation. Results show decreased M2 markers and increased CD86, with M1 macrophages inducing apoptosis in MB49 bladder cancer cells via TNF-α and IL-12.

BISCp-10

Interferometric measurement of ultrasound generated by femtosecond laser pulses on a glass surface

Shunto Watanabe, Kaede Ymaguchi, Sotaro Komatsu, Yoshio Hayasaki
Center for Optical Research and Education (CORE), Utsunomiya University

Broadband ultrasound is generated through laser ablation at the focusing point when a femtosecond laser pulse is focused on a material. We propose an ultrasonic measurement system based on optical interferometry. Optical interferometry measures the displacements that occurred at the arrival point of the sound waves. We demonstrated the speed of sound obtained from the measurement point and the arrival time.

BISCp-11

Phase-contrast microscopic imaging using a circular RGB laser and an objective lens for sample illumination

Takumi Niino[1], Masaki Hisaka[2]
[1]Graduate School of Biomedical Engineering, Osaka Electro-Communication University, [2]Department of Medical Science, Osaka Electro-Communication University

We developed an optical microscope using oblique illumination to observe the amplitude and phase-contrast images of tissue cells. In this study, a circular RGB laser source, based on a microelectromechanical systems projector, was employed to capture spectral information with sufficient light intensity. Simultaneously, an objective lens for sample illumination was introduced to suppress chromatic aberration, enabling experimental RGB image acquisition.

BISCp-12

High-Speed Volumetric Imaging of Deep-Brain Neural Dynamics Using Two-Photon Endoscopy with Deep-Learning Contrast Enhancement

Pin-Chun Liao[1], Risa Kitamura[2], Wun-Ci Chen[3], Cheng-Han Wang[4], Po-Ting Yeh[4,5], Shih-Kuo Chen[4,6,7], Shun-Chi Wu[3,8], Shi-Wei Chu[1,8,9]
[1]Department of Physics, National Taiwan University, 10617 Taipei, Taiwan., [2]Department of Psychology, National Taiwan University, 10617 Taipei, Taiwan., [3]Department of Engineering and System Science, National Tsing Hua University, Hsinchu, 30013, Taiwan., [4]Department of Life Science, National Taiwan University, 10617 Taipei, Taiwan., [5]International Graduate Program in Interdisciplinary Neuroscience, National Taiwan University and Academia Sinica, Taipei, Taiwan., [6]Neurobiology and Cognitive Science Center, National Taiwan University, 10617 Taipei, Taiwan., [7]Center for Biotechnology, National Taiwan University, 10617 Taipei, Taiwan., [8]Brain Research Center, National Tsing Hua University, Hsinchu, 30013, Taiwan., [9]Molecular Imaging Center, National Taiwan University, Taipei, 10617, Taiwan.

We developed a two-photon microendoscopy system with dual gradient-index lenses to capture SCN neural dynamics *in vivo*. Deep-learning denoising and aberration correction enhance image contrast, advancing studies of circadian rhythms and deep-brain connectivity.

BISCp-13

Evaluation of phototoxicity in tumor cells under 5-ALA treatment by multiphoton excitation for the indication expansion of PDT

Kosuke Fuse[1], Shoki Yasjiki[1], Katsuhiro Ogawa[2], Hidefumi Shiroshita[2], Masafumi Inomata[2], Keiichi Koizumi[1], Yusuke Oshima[1]
[1]University of Toyama, [2]University of Oita

We focused on multiphoton excitation and evaluated the phototoxicity in tumor cells under 5-ALA treatment by multiphoton excitation for the indication expansion of PDT in *in vivo* condition.

BISCp-14

Application of beam scanning complex surface plasmon resonance sensor for biosensing

Katsuma Murata[1], Yu Tokizane[2], Eiji Hase[2], Takeo Minamikawa[2,3], Takeshi Yasui[2]
[1]Tokushima University, [2]Institute of Post-LED Photonics, [3]Osaka University

By combining a beam-scanning angular surface plasmon resonance sensor (SPR) with a heterodyne interferometer, we determined the SPR angle from changes in both optical reflectance and optical phase. The basic performance of the system indicates that the optical phase was more accurate than the optical reflectance.

Poster Session <Exhibition Hall A>

Thursday, 24 April

BISCp 13:30-15:00

BISCp-15

Scanning Holographic Microscope by Random Structured Light

Jung-Ping Liu, Chen-Hsiang Huang
Feng Chia University

In this study, a multimode fiber together with an electrooptic modulator are applied to produce a heterodyning random structured light. The specimen is raster scanned by the structed light and the scattering object light is detected by a photodetector. Three-dimensional images are retrieved using the pre-measured point-spread function of the system.

BISCp-16

Airy light-sheet illuminator using metasurface

Hung-Chuan Hsu[1,2,3], Sunil Vyas[2], Kuang-Yuh Huang[3], Takuo Tanaka[1,4], Din Ping Tsai[5,6,7], Yuan Luo[2,8]
[1]Innovative Photon Manipulation Research Team, RIKEN Center for Advanced Photonics, [2]Institute of Medical Device and Imaging, National Taiwan University, [3]Department of Mechanical Engineering, National Taiwan University, [4]Metamaterials Laboratory, RIKEN Cluster for Pioneering Research, [5]Department of Electrical Engineering, City University of Hong Kong, [6]Centre for Biosystems, Neuroscience, and Nanotechnology, City University of Hong Kong, [7]State Key Laboratory of Terahertz and Millimeter Waves, City University of Hong Kong, [8]YongLin Institute of Health, National Taiwan University

Light-sheet fluorescence microscopy is well-known in optical sectioning capability, low phototoxicity, and large field of view (FOV). Integrating metasurfaces with Airy illumination enhances the FOV, simplifies setup, and enables various nano-optic applications in biology and clinical research.

BISCp-17

3D Autofocus and Tracking of Transparent Objects Using a Waveguide-Based Digital Holographic Microscope

Ayaka Tabuchi, Kousuke Nakao, Maryam Faheem, Rintaro Horimizu, Yusuke Kikuchi, Eri Kajikawa, Eriko Watanabe
The University of Electro-Communications

Digital holographic microscopy (DHM) enables label-free and noninvasive three-dimensional (3D) imaging. In this study, we further enhance our compact and simple imaging system, waveguide-based DHM, by integrating autofocusing functions for tracking objects in 3D spaces.

BISCp-18

Optical properties of carbon-deposited lung tissue for photodynamic therapy in lung cancer

Himemi Watabe[1], Yu Shimojo[1,2,3], Takumi Sonokawa[4], Jitsuo Usuda[4], Takahiro Nishimura[1]
[1]Osaka University, [2]Osaka Metropolitan University, [3]Research Fellow of Japan Society for the Promotion of Science, [4]Nippon Medical School Hospital

This study investigated the optical properties of lung tissues with and without carbon deposition for understanding the effect of smoking-induced carbon particle deposition in lung tissue on photodynamic therapy.

BISCp-19

Metasurface-based common-path digital holographic microscopy

Yu-Xiang Wang[1], Chen-Ming Tsai[2,3], Cheng-Hung Chu[5], Min-Xuan Wang[2,4], Yuan Luo[1,2,5]
[1]Program for Precision Health and Intelligent Medicine, National Taiwan University, [2]Institute of Medical Device and Imaging, National Taiwan University, [3]Department of Biomedical Engineering, National Taiwan University, [4]Department of Mechanical Engineering, National Taiwan University, [5]YongLin Institute of Health, National Taiwan University

Digital holographic microscopy (DHM) is a powerful quantitative phase imaging (QPI) method, but its traditional interferometric setup limit the miniaturization. This work integrates metasurface technology, with its nanometer-scale dimensions and superior optical properties, into a DHM system. The resulting common-path configuration enhances stability and delivers high-quality QPI imaging of cells, as demonstrated experimentally.

BISCp-20

Tomographic Spectroscopy for Multilayer with Complex Refractive Indices

Shuto Onodera
Saitama University

We have proposed a spatially resolved tomographic spectroscopy for the multilayer sample. In the analysis method for determining the complex refractive index of a multilayer sample with light absorption, we confirmed that the accuracy can be improved by applying a window function when analyzing the reflected light spectrum using the Kramers-Kronig transform.

BISCp-21

The Symphony via Photoelectrochemical for Alzheimer's Disease

Jung-Chih George Chen[1,2,3,4,5,6,7,8]
[1]National Yang Ming Chiao Tung University / Institute of Biomedical Engineering, [2]National Yang Ming Chiao Tung University / Electrical and Computer Engineering, [3]National Yang Ming Chiao Tung University / College of Artificial Intelligence, [4]National Yang Ming Chiao Tung University / Biological Science and Technology, [5]National Yang Ming Chiao Tung University / Medical Device Innovation & Translation Center, [6]Catholic Mercy Hospital, Hsinchu., [7]Knights of Ordo Equestris Sancti Sepulcri Hierosolymitani, [8]Association of Chemical Sensors in Taiwan

Dementia, particularly Alzheimer's disease, is anticipated to become a critical and challenging social and medical issue in the near future. This study integrates biomedical materials, biosensing, and bio-optoelectronic technologies into an innovative photoelectrochemical approach, combined with the MMSE scale, to achieve a groundbreaking advancement.

BISCp-22

Simulated relationship between the spectral reflectance and penetration depth of photons in skin with slit array irradiation model

Iori Kojima[1], Naomichi Yokoi[2], Kumiko Kikuchi[3], Tomonori Yuasa[1], Yoshihisa Aizu[1]
[1]Muroran Institute of Technology, [2]Chitose Institute of Science and Technology, [3]Shiseido Co., Ltd., MIRAI Technology Institute

In the slit array irradiation, the detected light intensity distribution in the non-irradiated area is affected by internal skin parameters. Therefore, in this study, the relationship between the spectral reflectance of the non-irradiated area and the penetration depth was investigated using Monte Carlo simulation under the assumption of image detection.

BISCp-23

Detection of oral squamous cell carcinoma using indigenously developed multimodal optical imaging and spectroscopy device

Veena Singh[1], Pramila Thapa[2,1], Vivek Nayyar[2], Varun Surya[2], Deepika Mishra[2], Dalip Singh Mehta[1]
[1]Bio-photonics and Green-photonics Laboratory, Dept. of Physics, Indian Institute of Technology Delhi, Hauz-Khas, New Delhi 110016, India, [2]Department of Oral Pathology and Microbiology, Center for Dental Education & Research, All India Institute of Medical Sciences (AIIMS), Ansari Nagar, New Delhi, India

This paper describes the application of an indigenously developed multimodal device for the detection of oral squamous cell carcinoma. The multimodality integrates autofluorescence imaging with autofluorescence spectroscopy, enhancing the sensitivity and specificity of the device. The device is used on 65 OSCC cases, and the corresponding results are discussed.

BISCp-24

Confocal imaging using Volume holographic lenslet array

Surag Athippillil Suresh[1], Chao-Ming Liu[2], Sunil Vyas[2], Wen-Pin Chen[2], J. Andrew Yeh[1], Kuang Yuh Huang[2], Yuan Luo[2]
[1]National Tsing Hua University, [2]National Taiwan University

Confocal imaging achieves high resolution but slow scanning. A volume holographic lenslet array with a super Gaussian beam enables uniform multifocal illumination, accelerating acquisition without quality loss. This advancement is ideal for high-speed multifocal microscopy applications.

BISCp-25

Digital holography with a linear sensor for topographic measurement of a moving object

Yuma Sato, Yoshio Hayasaki
Utsunomiya University

Digital holography implemented with a linear sensor for height measurements of a linealy moving object. The Fourier transform method with one-dimension is performed. The digital holographic system can measure an object that moves perpendicular to the optical axis at the constant speed.

BISCp-26

Holographic Tomography using Single Phase Structured Illumination

Nishant Goyal, Kedar Khare
Indian Institute of Technology Delhi (IITD)

We present tomographic reconstruction of 3D refractive index using phase-structured illumination. Typically 2D scattered fields are holographically recorded by employing multiple-angled illuminations (in hundreds) which seem to make the system hardware unstable and complex. We report that 3D samples with sufficient sparsity may be reconstructed from single phase-structured illumination using an iterative optimization framework with L1 norm minimization.

BISCp-27

Generation of Abrupt Autofocusing beam through Metasurfaces

Yuan Luo[3], Zu-En Hsieh[1], Ming Lun Tseng[2], Sunil Vyas[3], Hsin Yu Kuo[3], Cheng Hung Chu[3], Mu Ku Chen[4], Hsiang-Chieh Lee[5], Wen-Pin Chen[6], Vin-Cent Su[7], Xu Shi[8], Hiroaki Misawa[8], Kuang-Yuh Huang[9], Din Ping Tsai[2], Pan-Chyr Yang[10]
[1]Program for Nanoengineering and Science, National Taiwan University, [2]Research Center for Applied Sciences Academia Sinica, [3]Institute of Medical Device and Imaging, National Taiwan University, [4]Department of Electrical Engineering City University of Hong Kong, [5]Graduate Institute of Photonics and Optoelectronics and Department of Electrical Engineering National Taiwan University, [6]Department and Graduate Institute of Pharmacology National Taiwan University, [7]Department of Electrical Engineering National United University, [8]Research Institute for Electronic Science Hokkaido University, [9]Department of Mechanical Engineering, National Taiwan University, [10]Institute of Biomedical Sciences Academia Sinica

Lasers are crucial in biomedical applications but face challenges in deep tissue penetration and obstacle circumvention. This study employs metasurface-based abrupt autofocusing beams to overcome these limitations, enhancing imaging and functionality in complex environments.

Poster Program

Poster Session <Exhibition Hall A>

Thursday, 24 April

HEDSp 13:30-15:00

HEDSp-01

Investigation of spin transition in laser shock compressed Fe_2O_3

Alexis Amouretti[1], Tatiana Pikuz[1], Hirotaka Nakamura[1], Yoichiro Hironaka[1], Marion Harmand[2], Kohei Miyanishi[3], Keiichi Sueda[3], Makina Yabashi[3], Toshinori Yabuuchi[4], Céline Crépisson[5], Sam Vinko[5], Yuji Fukuda[6], Kohdai Yamamoto[1], Yusuke Nakanishi[1], Naoki Yamagata[1], Kai Taketoshi[1], Rei Sakaguchi[1], Daisuke Ohkura[1], Masaki Nakagawa[1], Gooru Masaoka[1], Norimasa Ozaki[1]
[1]Osaka University, [2]PIMM, [3]RIKEN, [4]JASRI, [5]Oxford University, [6]KPSI

In this poster, we present the results of experiments measuring simultaneously the crystalline structure and the spin state of laser shocked compressed Fe_2O_3 up to 150 GPa, by the means of in-situ x-ray diffraction and the recently developed x-ray emission spectroscopy diagnostics at SACLA (SPring-8 Angstrom Compact free electron Laser).

HEDSp-02

Ionic transport properties in C–H–O ternary superionicity at planetary interior conditions

Daisuke Murayama[1], Satoshi Ohmura[2], Ryosuke Kodama[1,3], Norimasa Ozaki[1,3]
[1]Osaka University, [2]Hiroshima Institute of Technology, [3]Institute of Laser Engineering

Hydrogen, oxygen, and carbon are major constituents in the ice giants Uranus and Neptune. The three elements are assumed to mix in the icy mantles of the ice giants; thus we investigated phase behaviors and atomic diffusivities of C-H-O ternary system by using *ab initio* molecular dynamics simulations in high temperatures and pressures up to 7000 K and 500 GPa. Our findings introduce new layers beneath water-rich icy mantle layers.

HEDSp-04

Study on structure change of laser-irradiated targets using ab-initio and classical molecular dynamics calculations

Ryotaro Kawai[1], Masayuki Takahashi[1], Yasuhiro kuramitsu[2], Kazuhiro Yabana[3], Naofumi Ohnishi[1]
[1]Tohoku University, [2]Osaka University, [3]Center for Computational Sciences, Tsukuba University

Classical molecular dynamics calculations with consideration of electron temperature using optical properties calculated from first-principles calculations were performed to investigate the effect of prepulse on laser-ion acceleration.

HEDSp-05

A Machine Learning Study of Properties of D_2O up to 8 Million Kelvin from First Principles

Margaret Lynn Berrens[1], Abhiraj Sharma[2], John Pask[1], Sebastien Hamel[1]
[1]Physics Division, Lawrence Livermore National Laboratory, [2]Department of Civil Engineering, Indian Institute of Technology Roorkee

In this study, we use Kohn-Sham DFT MD accelerated by an on-the-fly machine-learned force field to investigate the properties of D_2O under warm dense matter conditions, inluding calculating the equation of state, Hugoniot, and transport properties.

HEDSp-06

Laboratory Measurement of L-Shell Opacity at GEKKO XII/LFEX High Power Laser Facility

Jinyuan Dun[1,2], Franck Delahaye[3,4], Yuuga Karaki[1,2], Hiroki Matsubara[1,2], Tatiana Pikuz[1], Andrea Ciardi[3,4], Hanna Lahmar[5], Sebastien Lepape[5], Bruno Albertazzi[5], Patrick Renaudin[6], Christophe Blancard[6], Laurent Jacquet[5], Ryunosuke Takizawa[1], King Fai Farley Law[1], Yulin Gong[1], Michel Koenig[5], Shinsuke Fujioka[1,7]
[1]Institute of Laser Engineering, Osaka University, Osaka, Japan, [2]Graduate School of Science, Osaka University, Osaka, Japan, [3]LERMA, Observatoire de Paris, Paris, France, [4]Sorbonne Universities, Paris, France, [5]LULI-CNRS, CEA, Sorbonne Universities, Paris, France, [6]Département de Physique Théorique et Appliquée, CEA/DAM Île-de-France, France, [7]National Institute for Fusion Science, Gifu, Japan

In this paper, we present the work done toward verifying the SNL opacity experiment results and discuss the prospects for future research. The experimental campaign yielded confirmation that the radiation temperature achieved by the laser-driven hohlraums with disparate geometric designs and driven laser energy combinations could reach ~100 to 120 eV radiation energy.

HEDSp-07

Role of resistivity and pressure structure in energy transport in laser-generated high energy density plasmas

Natsumi Iwata[1], Tomoyuki Komatsu[2], Yasuhiko Sentoku[1]
[1]Institute of Laser Engineering, Osaka University, [2]Graduate School of Science, Osaka University

We theoretically study the energy transport in solid targets under intense laser irradiation. The dependence of the current structure, which governs the path of energy transport, on resistivity and electron pressure distribution will be discussed.

HEDSp-08

Origin of the Crab's Filaments and Their Roles on σ- and κ- Problems

Shuta J Tanaka[1], Shu-ichiro Inutsuka[2]
[1]Aoyama Gakuin University, [2]Nagoya University

The Crab Nebula is a cloud of magnetised relativistic electron-positron plasma supplied from its central pulsars. The Crab Nebula is named after it's filamentary structures observed in optical wavelength which originates from the line emissions of neutral and ionized heavy elements. This is interesting because the neutral (< 103 K) particles are embedded in the relativistic plasma (~ 10^{16} K). We will discuss the origin of the Crab's filaments.

HEDSp-10

Laser light propagation from relativistic transparency regime to hole boring regime

Hayato Yanagawa[1], Natsumi Iwata[2], Yasuhiko Sentoku[2]
[1]Graduate School of Science, Osaka University, [2]Institute of Laser Engineering, Osaka University

We study the conditions for laser propagation in a plasma from the relativistic transparency regime to the hole boring regime. Using particle-in-cell simulations, we constructed a theoretical model in its transition region.

HEDSp-11

Achieving Efficient Heating of High-Density Plasma by Multi-Picosecond PW Laser Driven Thermal Waves

Yasuhiko Sentoku, Hayato Yanagawa, Naoki Okuda, Natsumi Iwata
Institute of Laser Enigneering, The University of Osaka

We comprehensively studied the propagation, absorption, and energy transport processes of laser beams in imploding plasmas with a help of multi-dimensional kinetic plasma simulations in the fast ignition and found the efficient energy transport mode "thermal wave" could be driven by PW laser light.

HEDSp-12

Monodirectional-drive inertial confinement fusion using ultra-high intensity laser for bright pulsed point neutron source

Kensei Iwasa[1], Yuki Abe[1,2], Hikaru Kato[1], Alessio Morace[2], Takumi Minami[1], Yuji Fukuda[3], Yasunobu Arikawa[2], Yoshitaka Mori[4], Eisuke Miura[5], Atsushi Sunahara[6], Hideaki Habara[1,2], Akifumi Yogo[2], Zhe Zhang[7], Shinsuke Fujioka[2], Yasuhiro Kuramitsu[1,2]
[1]Graduate School of Engineering, Osaka University, [2]Institute of Laser Engineering, Osaka University, [3]Quantum Science and Technology, Kansai Photon Science Institute, [4]The Graduate School for the Creation of New Photonics Industries, [5]National Institute of Advanced Industrial Science and Technology, [6]School of Nuclear Engineering, Purdue University, [7]Institute of Physics, Chinese Academy of Science, China

We developed a pulsed point neutron source using a mono-directional laser driven inertial confinement fusion scheme. A relativistic-intensity laser (>10^{18} W/cm^2) irradiates a deuterated spherical target, inducing target normal sheath acceleration (TNSA). High-energy dense plasma forms, producing neutrons via d-d fusion. Our experiments achieved >10^{10} n/4π/pulse with a source size <100 μm.

HEDSp-13

Fast-electron generation by kinetic laser-plasma interactions in sub-relativistic regime

Yuji Takagi, Yasuhiko Sentoku, Natsumi Iwata
Osaka University

In laser-plasma interactions with laser intensities $10^{15\text{-}16}$ W/cm2, electron energies above 100 keV are observed in particle-in-cell (PIC) simulations. We report the details of the acceleration process of the suprathermal electrons and its model.

HEDSp-14

Three-dimensional Simulation of Multi-ion Acceleration by Laser-driven Magnetic Reconnection

King Fai Farley Law[1], Jinyuan Dun[1], Yuki Abe[2], Alessio Morace[1], Yasunobu Arikawa[1], Philipp Korneev[3], Joao Jorge Santos[4], Shinsuke Fujioka[1,5]
[1]Institute of Laser Engineering, Osaka University, [2]Graduate School of Engineering, Osaka University, [3]Lebedev Physical Institute, [4]CELIA, CEA, CNRS, Universite de Bordeaux, [5]National Institute for Fusion Science

Three-dimensional PIC simulations of laser-driven magnetic reconnection reveal multi-ion acceleration dynamics. Ion energy scales with charge-to-mass ratio, highlighting deviations for protons. Results deepen understanding of species-dependent acceleration mechanisms.

HEDSp-15

Investigation of the origin of hot electrons in cluster-beam laser experiments

Qing Wang[1], Zhi Chao Li[2], Zhan Jun Liu[1], Hong Bo Cai[1]
[1]Institute of Applied Physics and Computational Mathematics, [2]Laser Fusion Research Center

In cluster-beam laser experiments, the hot electron temperature is much higher from backward stimulated Raman scatter (BSRS) predictions. Analysis indicates that Landau damping is crucial for the occurrence of forward SRS sidescatter (FSRSS). Simulations suggest FSRSS as a potential mechanism of hot electron generation in uniform low-density plasmas, with a temperature matching experimental diagnostics.

Poster Session <Exhibition Hall A>

Thursday, 24 April

OMCp 13:30-15:00

OMCp-01

Generation of high-precision vector beam using a spatial light modulator

Shohei Koike
Utsunomiya University

This study demonstrates the generation of high-precision vector beam by employing a spatial light modulator to correct for optical system imperfections.

OMCp-02

Switching of Surface Temperature of Plasmonic Titanium Nitride Nanostructures by Circularly Polarized Light

Kenji Setoura[1], Mamoru Tamura[2,3], Tomoya Oshikiri[4,5], Takuya Iida[3]
[1]University of Hyogo, [2]Osaka University, [3]Osaka Metropolitan University, [4]Tohoku University, [5]Hokkaido University

Optothermal manipulation requires precise control of local temperature distribution. We show numerically that circularly polarized light can modulate the surface temperature of chiral plasmonic titanium nitride nanostructures.

OMCp-03

Structural transitions between achiral and chiral crystal structures of planar or axially chiral molecules controlled by light irradiation

Ryusei Oketani[1], Musashi Okada[1], Saki Ikeda[1], Ken-ichi Yuyama[2], Takuya Nakashima[2], Ichiro Hisaki[1]
[1]Osaka University, [2]Osaka Metropolitan University

We report that achiral crystal of a planar chiral phenothiazine derivative undergo structural transitions into chiral crystals, and control this process through light irradiation. By irradiating laser of wavelengths corresponding to their absorption bands, we successfully achieved spatiotemporal control of the structural transition.

OMCp-04

Polarized emission property of fluorescent molecules excited by a circularly polarized light on a bull's eye plasmonic chip

Yuma Yoshida, Yasunori Nawa, Keiko Tawa
Graduate School of Science and Technology, Kwansei gakuin University

We previously reported that line and space type-plasmonic chip can make a polarization axis of transmitted light rotate under the irradiation of a circularly polarized light. In this study, polarized emission of fluorescent molecules Cy5-SA on a bull's eye-type plasmonic chip was measured and observed the polarization axis of enhanced emission rotated clockwise or anticlockwise for incident plane depending on a circularly polarized excitation light.

OMCp-05

Evaluation of optical gradient and thermophoretic force under optical trapping conditions using Brownian dynamics simulation

Koki Ide[1], Tetsuro Tsuji[2], Takayuki Suzuki[1], Kenji Setoura[3]
[1]Kobe City College of Technology, [2]Kyoto University, [3]University of Hyogo

Near-infrared laser trapping induces thermophoretic forces in addition to optical forces. Brownian dynamics simulations, which we developed for evaluation and prediction of trapping behavior, predicted optimal conditions for optothermal manipulation utilizing the thermophoretic force.

OMCp-06

Control of plasmonic optical fields excited in a single gold nanoplate by helical light

Kohei Imura, Seiju Hasegawa
Waseda University

We examine optical properties of single gold nanoplates illuminated by helical light. Simulated extinction spectra show unique spectral features depending on the orbital angular momentum of the incident beam. Gold nanoplate shows nonlinear photoluminescence by near-infrared pulse excitation. Two-photon excitation images of the nanoplates are observed by detecting the PL and found that the unique spatial distributions are visualized.

OMCp-07

Electrically Controlled Goos-Hänchen Shift of a Light Beam by a ZnO-GaAs Structure

Marsden Indoc Badlisan, Nathaniel Hermosa, II
University of the Philippines-Diliman

We propose an electrically controlled device that can manipulate reflection on demand by utilizing the Goos-Hänchen shift of a light beam. Our device is a ZnO thin film above a GaAs substrate.

OMCp-08

Ultra-High Four-Layer Transparent Conducting Oxide Film Deposited by Low Temperature Sputtering

Yan-Jing Xu, Yi-Lun Lee, Si-Yu Huang, Bo-Hong Liu, Zi-Chi Yen, Chia-Ching Wu
Department of Applied Science, National Taitung University

In this study, the transmittance of ITO/GZO/Ag/ITO four-layer electrode solving the problem of low transmittance in NIR range. The transmittance of ITO/GZO/Ag/ITO four-layer electrode is higher than the ITO/Ag/ITO sandwich structure in visible light and NIR range. A semitransparent spiro-OMeTAD/$CH_3NH_3PbI_2$/SnO_2/ITO perovskite solar cell with ITO/GZO/Ag/ITO four-layer electrode exhibits an photoelectric conversion efficiency of about 14%.

OWPTp 13:30-15:00

OWPTp-01

InGaP Power Converter Module Under High-Power 638 nm Laser Irradiation of 7 W

Gin Hirano[1], Ryusei Takahashi[1], Junichi Suzuki[1], Reo Aoyama[1], Moeka Chiba[1], Masaki Ayukawa[2], Masaki Maeda[2], Kazuyuki Iizuka[2], Toshihiko Fukamachi[2], Kouichi Akahane[3], Shiro Uchida[1]
[1]Chiba Institute of Technology, [2]Ushio Inc, [3]National Institute of Information and Communications Technology

We fabricated a power converter module of 96 InGaP solar cells and investigated the conversion efficiency under 638 nm laser light of up to 7 W. The conversion efficiency reached 25.8% at 7 W.

OWPTp-02

Construction of a high-precision dynamic OWPT model for toy EVs

Mahiro Kawakami, Tomoyuki Miyamoto
Institute of Science Tokyo

Dynamic OWPT is an effective method for charging of driving EVs and is expected to transmit power with less infrastructure facilities than other transmission methods. To design the infrastructure of D-OWPT, it is important to extract the problems by using the small toy EVs. Therefore, the accurate simulator of the toy EVs is built for predicting and analyzing the driving characteristics, and the effectiveness of the simulator was demonstrated for a new complex course.

OWPTp-03

Electrode Material and Annealing Temperature Optimization for Photovoltaic Device with Tunnel Junction

Takeru Yamada[1], Takaya Oshimo[1], Kotone Tabata[1], Junichi Suzuki[2], Reo Aoyama[2], Yukiko Suzuki[4], Natsuha Ochiai[4], Sho Aonuki[4], Youhei Toriumi[4], Kazuto Kashiwakura[4], Madoka Takahashi[4], Kouichi Akabane[3], Shiro Uchida[2], Masakazu Arai[1]
[1]University of Miyazaki, [2]Chiba Institute of Technology, [3]National Institute of Information and Communications Technology, [4]NTT Space Environment and Energy Laboratories

Using a laser of 1064 nm wavelength and only the top-cell structure of the tunnel junction of a 2-junction photovoltaic device, we investigated the differences in properties depending on the electrode material and annealing temperature.

OWPTp-04

Temperature increase of CIGS solar cells for Optical Wireless Power Transmission under laser light irradiation

Kyosuke Sato[1], Riku Maeno[1], Shuntaro Fujii[1], Moeka Chiba[1], Hironori Komaki[2], Hiroaki Nakamura[2], Hiroshi Tomita[2], Yusuke Oda[2], Takato Ishiuchi[2], Shiro Uchida[1]
[1]Chiba Institute of Technology, [2]Idemitsu Kosan Co., Ltd.

We investigated the temperature rise of CIGS solar cells under the high-power 1064 nm laser for 60 minutes. The temperature rose to approximately 11°C and 18°C at 500 mW and 1000 mW, respectively.

OWPTp-05

Sub-25 kHz Intrinsic Linewidth and 90 mW Optical Power in 1.55 µm DFB Laser for Advanced Photonics Applications

Te-Hua Liu[1,2], Chao-Hsin Wu[1,2,3,4]
[1]Graduate School of Advanced Technology, National Taiwan University, Taipei 106319, Taiwan, [2]Center for Quantum Science and Engineering, National Taiwan University, Taipei 106319, Taiwan, [3]Graduate Institute of Electronics Engineering, National Taiwan University, Taipei 106319, Taiwan, [4]Graduate Institute of Photonics and Optoelectronics, National Taiwan University, Taipei 106319, Taiwan

We demonstrate a 1.55-µm DFB laser delivering sub-25 kHz intrinsic linewidth, 90 mW optical power, and SMSR > 55 dB for stable single-mode operation. This high-performance laser suits next-generation coherent communications, LiDAR, and quantum applications.

NOTE

What's Happening in the Exhibition Hall?

OPTICS & PHOTONICS International Exhibition 2025 (OPIE'25)

In 1994, The Laser Society of Japan initiated LASER EXPO, which consists of seven optics-related EXPOs; LENS EXPO (Design & Manufacturing), Positioning EXPO, Light Sources & Optical Devices EXPO, Space & Astronomical Optics EXPO, Sensor & Imaging EXPO, and Optical Communication & Applications EXPO.

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Review the extensive list of exhibitors below to see who you'll meet at OPIE'25.

There is no charge to attend the exhibit for conference registrants and exhibit-pass only visitors.

Highlights

24 April 11:30-12:15 at Special Seminar Site 3

AR Smart Glasses Market Development

Pekka Laiho, OptoFidelity / **Hiroyuki Nomura**, Japan Laser Corporation

24 April 15:30-16:15 at Special Seminar Site 3

Introduction to CeramOptec's Multimode Optical Fibers

Peter Maushake, CeramOptec / T.E.M. Incorporated

25 April 11:30-12:15 at Special Seminar Site 3

Simulation of semiconductor lasers, VCSELS, and quantum dot lasers

Tom Davies, CBS Japan

Exhibitor List

Aachen Technology (Shenzhen)
ABEL
ActesKyosan
AD Science
AdlOptica Optical Systems
ADSTEC CORPORATION
Advanced Communication Media
AGC
Agilent Technologies Japan
AIM
AISAY
AITEC SYSTEM
AK CORPORATION
AkiTech LEO
Alnair
ALT
ALTECH
Altechna
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AMETEK
Amonics
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Asahi Kasei
ASAHI RUBBER
Asahi Spectra
ASKK
asphericon
Association for Innovative Optical Technologies
Austek
AUTEX
AVAL DATA
AYASE
BATOP
Beams
Beijing RealLight Technology
Beijing YHXC Photonics Technology
Beneq
Berlin Partner for Business and Technologie
BITRAN
BOOK Fair
BPF laser innovation
Brightlaser
Bunkoukeiki
Camerium
Canare Electric
Canon Marketing Japan
Canon Optron
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CASTECH
CBC Optics
CBS Japan
CDGM Glass
CEDRAT TECHNOLOGIES
CEITEC
Changchun Boxin Photoelectric
Changchun Glitter Optics
Changchun New Industries Optoelectronics Technology
Changsha AFiSy Technologies
Changzhou Run Chang Optoelectronics Technology
Chengdu Dien Photoelectric Technology
Chiyoda Optical Instruments
Chroma Technology Japan
CHRONIX
Chuo Precision Industrial
CIOE - China International Optoelectronic Exposition
Circle and Square
CLZ OPTICAL
Co-Creation Consortium for Joining and Welding with Blue Diode Laser
ColorLink Japan
COMSOL
Consortium of Visible Laser Diode Applications
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Japan Agency for Marine-Earth Science and Technology
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Japan Intense Light Field Science Society
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Measurement Image
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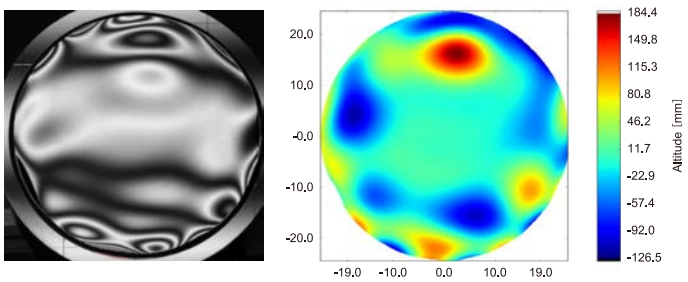

Applications
アプリケーション例

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