

# Report on OPTICS & PHOTONICS International Congress 2017 (OPIC2017)

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## 1. Introduction

OPTICS & PHOTONICS International Congress (OPIC) has been held annually since 2012 at Yokohama as an international forum to present and discuss the most up-dated R & D activities in optics and photonics over the world. The state-of-art technologies and products in optics and photonics are demonstrated at the co-located and jointly organized OPIE (OPTICS & PHOTONICS International Exhibition).

OPIC2017 was held in April 18-21, 2017 at Pacifico Yokohama Congress Center with Congress Co-Chairs: Christopher P. J. Barty (Lawrence Livermore National Laboratory, USA), Reinhart Poprawe (Fraunhofer Institute for Laser Technology, Germany) and Sadao Nakai (Osaka University, Japan) (Fig. 1).



Fig. 1 Congress Co-Chairs of OPIC2017:

Christopher P. J. Barty, Reinhart Poprawe, and Sadao Nakai (from left to right)

OPIC2017 was organized by OPTICS and PHOTONICS International Council, with the support of five Ministries of Japanese Government and Japan Business Foundation, and in cooperation with many research institutes and academic societies in Japan and foreign countries, as shown in Table 1.

Table 1. Organization of OPIC2017

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OPTICS & PHOTONICS International Congress 2017 (OPIC2017)  
Co-located with OPTICS & PHOTONICS International Exhibition 2017 (OPIE2017)  
Organized by OPTICS & PHOTONICS International Council

Specialized International Conferences were organized by

The Laser Society of Japan / The Optical Society of Japan / IFE Forum / Institute of Laser Engineering, Osaka University / The Graduate School for the Creation of New Photonics Industries / Akasaki Research Center (ARC), Nagoya University / SPIE – The International Society for Optics and Photonics / Institute for Nano Quantum Information Electronics, The University of Tokyo / Hiroshima University / The Executive Committee of Laser Solution for Space and the Earth / RIKEN SPring-8 Center / Research Center for Ultra-Precision Science & Technology, Osaka University

Supporting agencies of OPIC2017

Ministry of Education, Culture, Sports, Science and Technology (MEXT) / Ministry of Economy, Trade and Industry (METI) / Ministry of Agriculture, Forestry and Fisheries of Japan (MAFF) / Ministry of Health, Labour and Welfare (MHLW) / Ministry of Land, Infrastructure, Transport and Tourism (MLIT) / KEIDANREN (Japan Business Federation)

Cooperating agencies of OPIC2017

AESJ - Atomic Energy Society of Japan / AIST - The National Institute of Advanced Industrial Science and Technology / ILT - Institute for Laser Technology / JPC - Japan Photonics Council / JSPF - The Japan Society of Plasma Science and Nuclear Fusion Research / JST - Japan Science and Technology Agency / NEDO - New Energy and Industrial Technology Development Organization / OITDA - Optoelectronic Industry and Technology Development Association / OSJ - The Optical Society of Japan / QST - National Institutes for Quantum and Radiological Science and Technology / RIKEN / KAPID - Korea Association for Photonics Industry (Korea) / OSA - The Optical Society of America (USA) / Photonics Media (USA) / PIDA - The Photonics Industry & Technology Development Association (Taiwan) / SPIE - The International Society for Optics and Photonics (USA).

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OPIC is composed of Specialized International Conferences covering broad-ranged fields in optics and photonics. Each Specialized International Conference is planned and operated by the Conference Chair and his consortium of scientists, based on their own initiatives to strengthen and advance the research in each specific field. This approach helps Conference Chairs to organize attractive conferences with timely topics and up-dated speakers, and also to broaden the research networks by continuing to hold the conferences over many years.

## 2. OPIC2017 with 12 Specialized International Conferences

OPIC2017 was composed of 12 Specialized International Conferences, the largest number since the beginning of OPIC, owing to joining of 3 new Conferences: International Conference on Nano-photonics and Nano-optoelectronics (ICNN 2017) ,

Information Photonics 2017 (IP '17), and Light driven Nuclear-Particle physics and Cosmology (LNPC '17). These 12 Specialized International Conferences and the Conference Chairs are shown below.

- ALPS '17 - The 6th Advanced Lasers and Photon Sources  
Chair: H. Yoneda (University of Electro-Communications)
- BISC '17 - Biomedical Imaging and Sensing Conference 2017  
Chair: T. Yatagai (Utsunomiya University)
- CLES/LANSA '17 - Conference on Laser Energy Science / Laser and Accelerator Neutron Sources and Applications 2017  
Chairs: H. Nishimura (Osaka University) and R. Hanayama (GPI)
- HEDS 2017 - International Conference on High Energy Density Science  
Chair: R. Kodama (Osaka University)
- ICNN 2017 - International Conference on Nanophotonics and Nano-optoelectronics  
Chair: Y. Arakawa (University of Tokyo)
- IP '17 - Information Photonics 2017  
Chair: Y. Hayasaki (Utsunomiya University)
- LDC '17 - Laser Display and Lighting Conference 2017  
Chair: K. Kuroda (Utsunomiya University)
- LEDIA '17 - The 5th International Conference on Light-Emitting Devices and Their Industrial Applications  
Chair: H. Amano (Nagoya University)
- LNPC '17 - Light driven Nuclear-Particle physics and Cosmology  
Chairs: K. Homma (Hiroshima University) and O. Tesileanu (ELI-NP)
- LSSE 2017 - Laser Solution for Space and the Earth  
Chair: T. Ebisuzaki (RIKEN)
- OMC '17 - The 4th Optical Manipulation Conference 2017  
Chair: T. Omatsu (Chiba University)
- XOPT '17 - International Conference on X-ray Optics and Applications 2017  
Chairs: T. Ishikawa(RIKEN) and K. Yamauchi (Osaka University)

The overall schedule of OPIC2017 is shown in Fig. 2. The OPIC Plenary Session, open to public, was held in the morning of 19th Wednesday. The Specialized International Conferences were held in parallel during 18-21 (Tuesday-Friday), with exception of Joint Sessions in the afternoon of 19th. The Posters were presented at the Exhibition Hall to stimulate interaction between OPIC and OPIE participants. The OPIC Get-Together was held in the evening of 17th Monday, and the OPIC Reception in the evening of 19th.

Statistics of OPIC and Specialized International Conferences during 2012-2017 are

summarized in Table 2. Some of the Specialized Conferences have been organized with different titles and some Conferences were held in other countries, as shown in italics in Table 2.

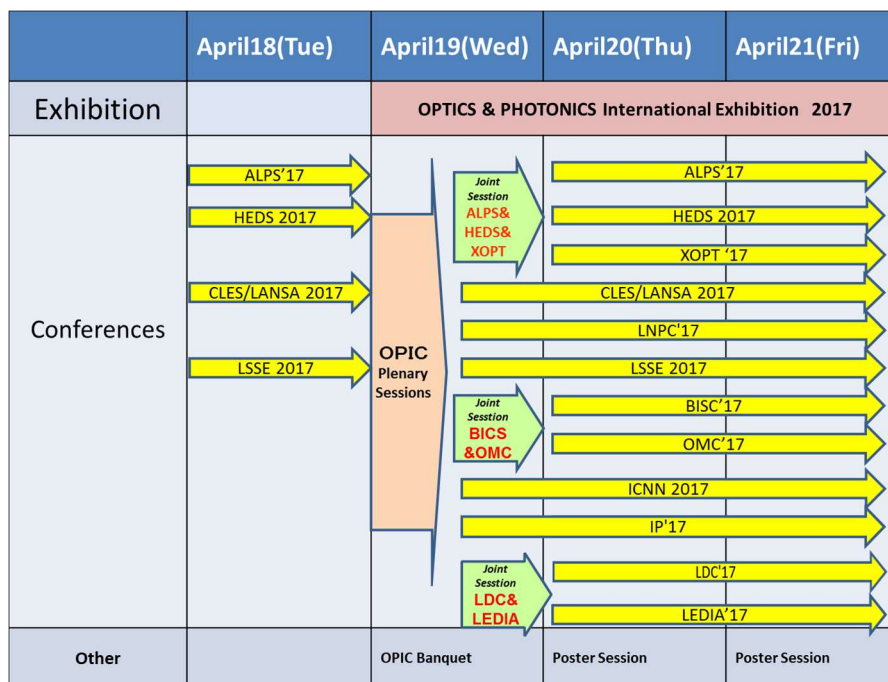


Fig. 2 Overall schedule of OPIC2017.

Table 2 shows that OPIC has been growing steadily as the international conference, as seen from the number of specialized conferences (13), the number of participants (1015) and its fraction of foreign participants (37 %), and the number of countries (31). The top 10 countries, in order of the number of participants (shown in the parentheses), are Japan (641), P. R. China (59), Taiwan (52), USA (42), Korea (42), Germany (37), France (18), UK (12), Romania (9) and Russia (7). (Here “country” refers to the place where participant’s affiliation is located.) These statistics show that OPIC is an international forum with broad scientific scopes, attended by the international communities in Asia, north America, Europe and Russia. The Specialized International Conferences held continuously over many years are now firm-footed with attendance of many participants who are looking forward to discussing the most-updated progress of their fields and meeting with long-term friends at OPIC.

The co-located OPIE2017 was held during April 19-21 by participation of 351 companies and organizations (5 % increase from 2016), including direct overseas exhibitions by 11 countries and 47 companies. Total number of the participants to OPIE2017 over 3 days was 15,214. Various activities were organized at OPIE including technical exhibitions, product demonstrations, and technical seminars. Also

the Award Ceremony of the 2017 Industrial Award by The Laser Society of Japan was held at the Exhibition Hall, and awards were presented to 8 companies in 3 categories.

Table 2 Records of OPIC and Specialized International Conferences during 2012-2017.

(Specialized International Conferences held previously and at other countries are shown in italics.)

Year	OPIC2012	OPIC2013	OPIC2014	OPIC2015	OPIC2016	OPIC2017
Date	April 25-27	April 23-26	April 22-25	April 22-24	May 17-20	April 18-21
Congress Chairs	K. Shimoda R. Byer	K. Shimoda R. Byer	K. Iga R. Byer A. Ostendorf	K. Iga C. Barty A. Ostendorf	K. Iga C. Barty A. Ostendorf	C. Barty R. Poprawe S. Nakai
Number of Specialized Conferences	6	10	9	7	11	12
Papers presented	296	411	570	478	736	729
Participants	519	677	782	732	1028	1012
Foreign participants (%)	24%	18%	27%	25%	32%	37%
Participants / Conference	86.5	67.7	86.9	104.6	93.5	84.3
Number of Countries	23	23	28	26	31	32
<b>Specialized International Conferences</b>	Conf. Chair	Conf. Chair	Conf. Chair	Conf. Chair	Conf. Chair	Conf. Chair
ALPS (Advanced Lasers and Photon Sources)	K. Midorikawa	K. Midorikawa	F. Kannari	N. Miyanaga	H. Yoneda	H. Yoneda
<i>SeTBio (Sens. Tech. for Biomater., Food, &amp; Agri.)</i>		N. Kondo				
BISC (Biomedical Imaging & Sensing Conf.)			T. Yatagai		T. Yatagai	T. Yatagai
<i>APBP (Asian &amp; Pacific-Rim Symp. Biophoton.)</i>				T. Iwai		
<i>CIFE (Conf. on Inertial Fusion Energy)</i>	H. Azechi					
<i>LANSAs (Laser &amp; Accler. Neutron Sourc. &amp; Appl.)</i>		H. Azechi				
<i>LSC (Laser &amp; Synch. Rad. Combin. Exper.)</i>			H. Azechi			
<i>CLE (Conf. on Laser Energetics)</i>				H. Azechi		
<i>CLES (Conf. on Laser Energy Science)</i>					H. Azechi	
CLES/LASNA (Laser Energy Sci. & Neutron Sources)						H. Nishimura, R. Hanayama
HEDS (Int. Conf. on High Energy Density Sci.)	R. Kodama	R. Kodama	R. Kodama	R. Kodama	R. Kodama	R. Kodama
ICNN (Int. Conf. on Nanophot. & Nanooptoelectr.)						Y. Arakawa
IP (Information Photonics)						Y. Hayasaki
LDC (Laser Display & Lighting Conf.)						K. Kuroda
LEDIA (Conf. on LED & Its Indust. Appl.)		H. Amano	H. Amano	H. Amano	H. Amano	H. Amano
<i>LIC (Laser Ignition Conf.)</i>		T. Taira	T. Taira	(in US)	T. Taira	
LNPC (Light Driven Nucl.-Particle Phys. & Cosmology)						K. Homma, O. Tesileanu
<i>LANE (Laser Appl. on Nuclear Engin.)</i>		H. Horiike				
LSSE (Laser Solution for Space & Earth)					T. Ebisuzaki	T. Ebisuzaki
OMC (Optical Manipulation Conf.)			T. Omatsu	T. Omatsu	T. Omatsu	T. Omatsu
<i>PLD (Int. Conf. on Pacific-Rim Laser Damage)</i>			T. Jitsuno	(in China)	T. Jitsuno, J. Shao, W. Rudolph	(in China)
<i>LPCC (Laser Proc. for CFRP &amp; Compos. Mater.)</i>	M. Kutsuna	H. Ogata				
<i>SLPC (Smart Laser Process. Conf.)</i>			Y. Okamoto		Y. Okamoto, R. Poprawe	
XOPT (Int. Conf. X-ray Opt., Det., Sourc. & Appl.)					T. Ishikawa, K. Yamauchi	T. Ishikawa, K. Yamauchi

### 3. OPIC2017 Plenary and Reception

OPIC 2017 Plenary Session was held in the morning of April 19. Welcome Address were given by Chris Barty, Congress Co-Chair, and Kenichi Iga, Chair of the International Advisory Board. The plenary speakers were introduced by Congress Co-Chairs, Sadao Nakai and Reinhard Poprawe.

Four plenary talks were presented on optics and photonics covering broad fields: vehicle safety system, ultra-precision control of optical waves, a new method for imaging and manipulating biological systems, and the first detection of the gravitational waves (Fig. 3).

Kazuoki Matsugatani, Director of ADAS Business and Technology Development Division, DENSO CORPORATION, presented the first speech titled “Optical Technologies Required for Vehicle Safety System”. With increase of traffic accidents worldwide, various new systems are being developed for partial automation of human driving; ADAS (Advanced Driver Assistance System), and automated driving of the vehicles; AD (Automated Driving). Very updated status of the ADAS systems were reported in this presentation, with emphases on optical technologies such as LIDAR (Light Detection and Ranging) and HUD (Head up Display) which are becoming key technologies for vehicle safety.



Fig. 3 Plenary speakers of OPIC2017:

Kazuoki Matsugatani, Kaoru Minoshima, Jeff A. Squier and Koji Arai  
(from left to right)

Kaoru Minoshima, The University of Electro-Communications and JST ERATO MINOSHIMA Intelligent Optical Synthesizer Project, presented the second plenary talk, titled “Ultra-Precision Control of Optical Waves by Use of Fiber-based Frequency Combs and its Metrology Application”. With the fiber-based frequency combs, electromagnetic waves covering the entire frequency region from MHz to THz are generated with fully controlled frequency, phase and polarization. New

application fields opened up by this approach were introduced in this talk, including rapid spectroscopy for material characterization, non-scanning 3D imaging and astronomy.

Jeff A. Squier, Colorado School of Mines, presented the third plenary talk, titled “Breaking Limits: Space-time Focusing Technologies for Imaging and Manipulating Biological Systems”. He has presented a novel method for imaging and manipulating biological systems with high spatial and temporal resolution. An ultrashort laser pulse is dispersed in space to spectral components and recombined at the focal point of a microscope, resulting in “simultaneous spatial and temporal focusing (SSTF)”. By combining SSTF with nonlinear microscopy, dynamic events of biological systems can be tracked with high temporal resolution over extended periods.

Koji Arai, LIGO senior scientist, Caltec, has presented the fourth plenary talk, titled “Gravitational Wave Detection: Laser Interferometer Technologies in Advanced LIGO”. On September 14, 2015, the gravitational wave was detected for the first time by advanced LIGO (Laser Interferometer Gravitational-Wave Observatory), which has detected space deformation of only  $4 \times 10^{-18}$  m, about one-thousands of the size of a proton. This “GW150914” was the first direct detection of the gravitational waves from a merging binary black holes 1.3 billion light years away. In this presentation, Dr. Arai has described scientific importance of the gravitational wave observation, laser interferometer technologies in Advanced LIGO, and its future direction.

The OPIC Reception was started by Sadao Nakai, Co-Chair of OPIC 2017, followed by Kagami-biraki, opening of a sake barrel (Fig. 4). With attendance of most of the OPIC participants, the Reception became a very good place for refreshing and starting the friendships among various communities.



Fig. 4 OPIC2017 Reception.

Kagami-Biraki by K. Iga, C. Barty, K. Arai, K. Minoshima and J. Squier (from left to right).

#### **4. Acknowledgement**

We are indebted to Dr. Christopher P. J. Barty, Prof. Reinhart Poprawe, and Prof. Sadao Nakai as Congress Co-Chairs, members of the International Advisory Board, members of the Organizing Committee and the Steering Committee, and Chairs of the Specialized International Conferences, for organizing OPIC2017. We would like to thank MEXT, METI, MAFF, MHLW, MLIT and KEIDANREN for supporting OPIC2017.

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