



# Newsletter

President: **Bruce McKellar** • Editor-in-Chief: **Kok Khoo Phua** • Editors: **Maitri Bobba; Sun Han**

DECEMBER 2015

## Message from the President



One of the major activities of IUPAP is the sponsorship and endorsement of conferences. This was important in the early days of IUPAP and it is even more important now. As we say on our website “Historically IUPAP came into existence charged with enhancing physics through the organization and sponsorship of the most appropriate conferences, and ensuring that all physicists had free access to the meetings. These goals basically remain today.”

We have just concluded our second meeting of the Council and Commission Chairs for 2015. A significant amount of our effort was devoted to our conferences, especially deciding which conferences to support in 2016, and what level of support could be provided for them, and also reviewing reports from our 2015 Conferences. The list of those conferences we are supporting in 2016 appears in this newsletter, and Council resolved to spend 44% of our expected 2016 income on their support.

Our review of the 2015 conferences concentrated on the level of participation by women in the conferences and was led by Vice President Alinka Lépine-Szilý, our Gender Champion. We learned that from 2014 to 2015 the fraction of women who were plenary and invited speakers had not improved significantly. On average 17% of conference participants were women, but only 13% of the invited speakers were women. IUPAP is conscious that the increasing number of women physicists needs to be better reflected in an increased fraction of women invited speakers and I strongly urge all involved, particularly host organisations, local organising committees and international program and advisory committees to work hard to make sure that we hear better reports from Alinka in future years.

Other topics which occupied us at our meeting included reviewing the work of our 18 Physics Commissions, 4 Affiliated Commissions, and 8 Working Groups. IUPAP covers a very wide sweep of physics and of policy related to physics. We approved a new Working Group, WG13: the Working Group on Newton’s Constant G, and are working on setting up two new working groups, on Accelerator Science, and of Soft Matter. It is possible that one or both of these new working groups will lead us to do something we haven’t done for 20 years — create a new commission.

It was suggested at our 2014 General Assembly that we should also link to more organisations which have related interests. Our subcommittee reported on this in some detail, but saw it as just one link in communicating better with physicists and societies of physicists world wide. This newsletter is one of the ways in which we do this, and I will be grateful if our readers can write and tell us what we should be including in it to tell you more about IUPAP and about physics world wide.

A very effective form of communication is person to person. We appointed many Associate Members of Commissions, and Inter Union representatives to facilitate our interactions between commissions and with related international unions and other similar bodies.

The Council and Commission Chairs heard of our plans to exploit the fact that our office is in Singapore to recruit new members from the south east Asian region.

If you are interested in more details about the meeting of the Council and Commission Chairs the minutes are available at <http://iupap.org/about-us/executive-council/executive-council-minutes/>

One of the great joys of being the IUPAP President is reading the reports from our conferences. These reports include a brief summary of new and interesting results presented at the conference. Reading them reinforces for me the wide variety of sub-disciplines that are a part of physics, and the exciting progress that is being made in all of them. Versions of this part of the conference reports, edited to just one or two new results, are reproduced in this newsletter so that you can also appreciate the range of advances in science being communicated in our conferences. More details are available from the conference website.

I thank you for your efforts to do and promote physics in 2015 and I wish you every success in 2016.

**Bruce McKellar**

## Message from the Secretary General



As Secretary General of IUPAP, I had a very fruitful discussion with Professor Paul Hardaker (Chief Executive, Institute of Physics) on 22 October 2015 in London.

The purpose of the discussion is to look into future collaboration especially with regards to IUPAP Women in Physics and high school physics.

We are trying our best to attract new members from Asean countries as well as other parts of Asia. We are setting up a strategic plan. I believe China will increase their share of votes.

The IUPAP accounts are in good shape and we look forward to an exciting 2016.

**Kok Khoo Phua**

## 100 Years of General Relativity

**Gary Horowitz, President** (AC2: International Society on General Relativity and Gravitation)

This year marks the centennial of Einstein's discovery of general relativity. After ten years of effort, culminating in a final month of intense activity, Einstein presented the final form of his theory to the Prussian academy on November 25, 1915. It not only contained a new theory of gravity, but it fundamentally changed our understanding of space and time. Einstein proposed that gravity is not a force acting in space as Newton had envisioned, but rather a manifestation of the curvature of space (and time) itself. This radical new view was confirmed by the observation of the bending of starlight as it passed by the sun during an eclipse in 1919.

The general relativity community joined IUPAP in 1957 with the formation of Affiliated Commission 2: The International Commission on General Relativity and Gravitation. This was an auspicious time. After the initial excitement of the bending of light died down, interest in general relativity waned. For the next 40 years, most of the effects of general relativity were believed to be too small to detect in the lab, and to have negligible effects for observational astrophysics. However starting in the late 1950's, interest in general relativity revived. It was facilitated by the Conference on the Role of Gravitation in Physics held at the University of North Carolina, Chapel Hill, in 1957 under the partial sponsorship of IUPAP, and grew rapidly after the discovery of quasars and pulsars in the 1960's. In 1971, AC2 officially became the International Society on General Relativity and Gravitation.

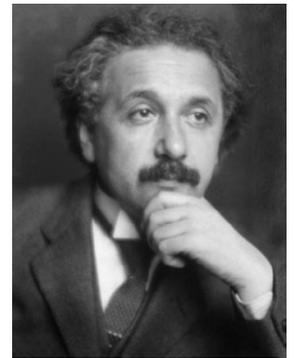
Since the formation of Affiliated Commission 2, our understanding of general relativity and its predictions has deepened enormously. This is a result of three main developments: (1) finding and studying a handful of exact solutions to the field equations of general relativity, (2) proving powerful theorems about general properties of large classes of solutions, and (3) developing the ability to numerically evolve generic initial conditions.

Experimental tests of general relativity have also improved dramatically during this time. Several predictions have now been confirmed with an accuracy of better than a hundredth of a percent. This includes the fact that time runs slower in a gravitational field. This surprising effect has not only been confirmed, but has practical applications as well. The Global Positioning System (GPS) that is widely used around the world would not work if relativistic effects were not taken into account.

General relativity has now matured from a novel physical theory to a working tool of many astrophysicists. The discovery that light is bent by massive objects has led to gravitational lensing, allowing astronomers to see very distant objects and map out the dark matter in the universe. As another application, many energetic sources are now modeled using black holes, one of the most exotic predictions of Einstein's theory.

To celebrate the centennial, many conferences were held around the world. A list can be found on our website: [isgrg.org](http://isgrg.org). In addition, we commissioned a book *General Relativity and Gravitation: A Centennial Perspective*, edited by Ashtekar, Berger, Isenberg, and MacCallum. This book contains reviews by leading experts that summarize our current understanding of the theory, and was published by Cambridge University Press.

Many new discoveries await us in the second century of general relativity. In the next few years we are likely to see direct detection of gravitational waves for the first time. These are ripples in space and time produced by the motion of massive, compact objects. Gravitational waves consistent with general relativity have been seen indirectly by their effect on the orbital period of binary neutron stars. (In fact, this observation received the 1993 Nobel Prize in physics.) The latest generation of gravitational wave detectors are now operating and should have the sensitivity to detect these waves directly. This will open up a new window on the universe. Another major advance will be the direct imaging of a black hole. This is within reach with the new Event Horizon Telescope. On a more theoretical side, attempts to combine general relativity with quantum theory have made great progress over the past 30 years, but we still do not have a complete theory of quantum gravity. In particular, applying quantum mechanics to black holes raises fundamental puzzles that still need to be resolved. The second century of general relativity promises to be as exciting as the first.



*Albert Einstein developed the theories of special and general relativity. Picture from 1921.*

## EINN celebrates 20 years

The conference on “Electromagnetic Interactions with Nucleons and Nuclei (EINN)” has been organized on Santorini and Milos Islands in Greece every other year since 1995. In 2011 its location was successfully moved to Paphos, Cyprus. The conference series covers experimental and theoretical topics in the areas of nuclear and hadronic physics. It also serves as a forum for contacts and discussions of current and future developments in the field. The conference has unofficially been a counterpart of the US Gordon conference on photonuclear physics and held in alternate years with traditionally a strong US participation. No proceedings are produced, in the tradition of Gordon and Euroconferences, in order to encourage the frank exchange of even tentative information.

The 11<sup>th</sup> EINN conference took place in Paphos, Cyprus 1-7 Nov. 2015 and attracted about 100 participants from 19 countries in Europe, North America and Asia. This year marked 20 years of successful organization of the conference series and a celebration took place organized by the first chair Dr. K. de Jager.

Since 2011, the conference program has dedicated sessions for postdoctoral fellows and advanced graduate students, who receive financial support. In 2013, an extra day was added before the conference with pedagogical lectures to facilitate the understanding by younger physicists of the more technical talks during the conference. This year the conference added a two day pre-conference event on *Frontiers and Careers in Photonuclear Physics – skill development and talks for students*, which was very-well received by the students. As customary, two topical

parallel workshops were organized, one on *Spectroscopy* and one on *the Spin structure of nucleons and nuclei*, which this year included selected talks from the abstracts submitted as well as invited talks. More than 40 students and postdoctoral fellows participated in the conference by receiving partial support. A highlight of the conference was the evening plenary poster session, which drew a large attendance with lively discussions. The authors of the three best posters were selected by secret vote of all attendees. The winners, who are young researchers from the Cyprus Institute, MIT and Mainz University, were awarded the Feynman Lecture Series and commemorative gifts, and presented a talk on the subject of their posters at the plenary section of the conference.

The conference covered a wide range of theoretical and experimental developments in hadron physics including, dipole moments of neutral and charged particles, the proton radius puzzle, new experimental facilities, dark matter searches, nuclear astrophysics, lattice QCD, spectroscopy, spin structure of nucleons, precision electroweak physics and new physics searches. With the study of QCD being a major focus of present activities and future plans in physics research worldwide, the EINN conference will continue to provide an important international forum, particularly for young physicists, for the foreseeable future.

More details for EINN 2015 visit:  
<http://www.cyprusconferences.org/einn2015/>  
 For a historical overview visit:  
<http://www.einnconference.org>

## IUPAP Laser Physics and Photonics Young Scientist Prizes 2015

The IUPAP Commission on Laser Physics and Photonics runs its Young Scientist Prizes every two years, awarding two prizes in each round. These the very highest level of achievements in fundamental and applied research. The 2015 prizes attracted nominations from Australia, Austria, Belgium, Canada, Chile, New Zealand, Spain, United Kingdom and the USA.

The 2015 IUPAP Young Scientist Prize in Laser Physics and Photonics (Applied Aspects) has been won by Dr Mark Thompson, and the 2015 IUPAP Young Scientist Prize in Laser Physics and Photonics (Fundamental Aspects) was won by Dr Robert Fickler.

To know more about the winners’ research fields, future developments, thoughts on Physics and Physics education and their journeys thus far, please refer to the online version of this newsletter at <http://iupap.org/newsletter/>.



Dr Mark Thompson being awarded his IUPAP Young Scientist Prize, C17 – Laser Physics and Photonics, Applied Aspects at CLEO– Europe/EQEC on 24th June 2015. Also pictured, Professor Luc Berge, Chair of the Quantum Electronics and Optics Division of the European Physical Society and Professor Deb Kane, Chair of IUPAP Commission 17.



Dr Robert Fickler being awarded his IUPAP Young Scientist Prize, C17 – Laser Physics and Photonics, Fundamental Aspects. At CLEO– Europe/EQEC on 24th June 2015. Also pictured, Professor Luc Berge, Chair of the Quantum Electronics and Optics Division of the European Physical Society and Professor Deb Kane, Chair of IUPAP Commission 17.

## “Medical Physics Capacity Building in Developing Countries” – IUPAP supports an AC4-Workshop at the World Congress on Medical Physics & Biomedical Engineering in Toronto, June 2015

Fridtjof Nüsslin

According to the WHO-World Cancer Report 2014 cancer is the major global health problem. Cancer cases are expected to increase from currently 15 million to about 24 million annually in 2035. Due to their populations growing and living longer the increasing cancer burden is threatening developing countries more than the industrialized world. More than 60% of the world's cancer cases and about 70% of the world cancer deaths occur in Africa, Asia, and Central and South America. Radiotherapy plays an important role in cancer management, i.e. according to current standards approximately 50% of all cancer patients should receive radiation treatment. Radiotherapy is a most effective modality and simultaneously a relatively cheap one, particularly compared to drugs. A radiotherapy clinic requires access to diagnostic imaging facilities, dedicated computers for treatment optimization and modern treatment units (typically today electron linear accelerators with X-ray and electron beam capability). To operate this equipment properly, an infrastructure with sufficient trained medical, physical and technical staff is essential. However, the disproportionality of cancer incidence hits particularly the developing countries due to lack of resources, both for investing in equipment and staffing. About 85% of the world's population lives in low-medium-income countries, but there are installed only one third of world's radiotherapy units. Even more threatening is the lack of staffing. In particular, medical physics capacity building should be part of all cancer control programmes in developing countries (supporting both - diagnosis and treatment). Therefore, several education and training initiatives have been launched by international, professional and non-governmental organizations to raise the staffing levels in developing countries.

On this background the International Organization for Medical Physics (IOMP) in cooperation with their Regional Organizations initiated various actions aiming to improve the situation for medical physics in the developing countries, specifically to increase the number of qualified clinical medical physicists in the understaffed regions. Partnering with the IAEA and the WHO provides an excellent platform to promote medical physics in the developing countries (specifically education and training) to advice in equipment operation and dosimetry, and to implementation of medical radiation protection standards.

Following a first workshop “Development of Medical Physics in Africa” co-sponsored by the IUPAP-AC4 which was held at the International Conference for Medical Physics 2013 in Brighton/UK, another workshop “Medical Physics Capacity Building in Developing Countries” – again co-sponsored by IOMP and IUPAP-AC4 – took place at the World Congress on Medical Physics & Biomedical Engineering in Toronto in June this year. Thanks to the congress sponsoring program of IUPAP and the travel grant program of the IOMP, among the about 70 attendees many young scientists from developing countries attended these events. The Workshop in Toronto covered presentations from Brazil, Philippines, Bangladesh, Morocco, Uganda, Nigeria and Ghana. It was very encouraging to see that the majority of the presentors were women.

The Workshop Chairs (S.Tabakov, F.Nüsslin) made an introduction, which included review of the progress made after the Brighton meeting. Since resource limitations for advancing medical physics in developing countries are tremendous, P.Smith (UK) addressed the problem of cost-effectiveness of medical physics services. Under the auspices of the IAEA numerous freely available materials have been published. It was recommended these to be used as guidelines when establishing national education & training programs. J.Izewska (IAEA, *Dosimetry and Medical Radiation Physics Section*) reviewed the activities of the IAEA which (additionally to the teaching material) include dedicated courses and measures for qualification of medical physicists from developing countries. Due to the lack of recognized institutions in those countries a most critical issue in medical physics training is the practical implementation of the internationally recommended two years structured clinical in-service training (residency program) to be undertaken in a hospital. A.Peralta from Philippines reported about experiences with setting up a residency program based on the IAEA *Clinical Training of Medical Physicists Specializing in Radiation Oncology* introduced in her country, recently. The practical challenges when facing education & training programs have been reported from Bangladesh (H.A.Azhari) and Morocco (A.Ibn Seddick). An interesting aspect of building medical physics capacities in developing countries is the involvement of the governmental authorities, particularly in the recognition of medical physicists as health professionals with significant importance for the healthcare provision. The views on the role of medical physicists in a national cancer campaign are quite divergent and challenge for stronger interactions. This was learnt from the reports from Uganda and Nigeria. Finally, V. Della Atuw-Ampoh (Ghana) gave an overview on the remarkable progress achieved in Ghana since 1970 when the medical physics training programme has been started. It was mainly the support by the Ghana Government and the Ghana Atomic Energy Commission in alliance with the IAEA which ensured implementation of a comprehensive education and training program for medical physicists, including a Master and since 2008 a PhD program. Meanwhile the whole medical physics programme matured and attracts students also from across Africa to be trained in Ghana.

In summary, the workshop on medical physics capacity building highlighted again the global problem of lacking qualified medical physicists in radiation medicine, particularly in developing countries. This is an even more serious issue when considering the complexity of modern equipment which on the other side is the condition for the evident achievements in health care, both in diagnosis and radiotherapy. In contrast, examples like the progress in Ghana demonstrate that concerted actions from national authorities, international organizations and the national medical physics community has power to change the adverse situation in less favorable regions. IOMP assured the attendees that the efforts in this field will continue and new Workshop and related activities on the subject are planned for the period ahead, including the International Conference on Medical Physics in Bangkok (December 2016) and the World Congress on Medical Physics and Biomedical Engineering in Prague (June 2018).

## Young Scientist Prize Winners – C19

### 2015 - Sylvain Guiriec



The 2015 IUPAP Young Scientist Prize in Astrophysics was awarded to Sylvain Guiriec for his “insightful and innovative contributions towards understanding the nature of Gamma Ray Burst (GRB) prompt emission, in particular the establishment of multi-component spectra, and the discovery of a new Peak Energy – Luminosity relation showing that GRBs can be used as standard candles and thereby as unique cosmological probes.”

Sylvain Guiriec was born in 1978 in Brest, France. In 2002 – 2003, he obtained a Masters degree in Material Sciences as well as an Engineering degree in Atomic and Molecular modeling and simulation, and computational structural analysis and design from the Institut Supérieur des Matériaux du Mans, France. He worked for two years as a young researcher at the Oak Ridge National Laboratory, USA, and at the Universitat Politècnica de Catalunya, Spain, where he studied radiation damage for the nuclear research field. In 2004, he obtained a Masters degree in Astrophysics, Planetology and Space Sciences & Techniques and an Engineering degree in Space Sciences & Techniques from Paul Sabatier University and the Institut Supérieur de l’Aéronautique et de l’Espace (SUPAERO), France. He received his PhD in December 2007 in Astrophysics from the Montpellier II University, France. His thesis was both theoretical and instrumental: (i) he studied the theoretical aspects of GRBs and made predictions of observability with the *Fermi* Gamma-ray Space Telescope (*Fermi*), and (ii) he participated to the integration and tests of the *Fermi*/Large Area Telescope (LAT), for which he developed an algorithm for suppressing its proton background.

After the launch of *Fermi* mid-2008, Sylvain Guiriec joined the National Space Science and Technology Center, USA – associated to the NASA Marshall Space Flight Center – with a 3-year postdoctoral position at the University of Alabama in Huntsville, USA. His main efforts focused on the observational analysis of GRBs, leading to the discovery of the first clear evidence for photospheric emission in their prompt emission. He also worked on Magnetars, Solar Flares and Terrestrial Gamma-ray Flashes. Since 2011 Sylvain Guiriec worked at NASA Goddard Space Flight Center, USA, first as a fellow of the NASA Postdoctoral Program and then as an Assistant Research Scientist affiliated with the University of Maryland, College Park and the Center for Research and Exploration in Space Science & Technology.

### 2014 - Nanda Rea



The 2014 IUPAP Young Scientist Prize in Astrophysics was awarded to Nanda Rea for her “her valuable contribution to the study of neutron stars. In particular for the discovery that magnetars can have low dipolar magnetic fields in line with the normal pulsar population, at variance with the long-standing belief that the electron critical magnetic field was a lower limit for magnetar-activity to take place.”

Nanda Rea was born in 1978 in Rome, Italy. She graduated from the University of Tor Vergata/INAF- Astronomical Observatory of Rome in 2006. Since then she spent several years with different post-doctoral fellowships (at SRON and The University of Amsterdam). In 2009 she started a 5 year tenure-track at the Institute for Space Sciences (ICE) in Barcelona, part of the CSIC (the Spanish National Research Council). In 2014 she was awarded an NWO Vidi grant to build a research group in The Netherlands. She is currently a tenured staff scientist at CSIC, and a research group leader at the Anton Pannekoek Institute of the University of Amsterdam.

Since her PhD years, Nanda Rea has worked on several aspects of neutron stars, both observationally and on the interpretation side. She was invited for colloquia and seminars in many worldwide institutes (Harvard, NYU, Max Plank, University of Sydney, ATNF, IAC, and others). In 2014 she was awarded the Zeldovich Medal for Astrophysics and Space Science from COSPAR and the Russian Academy of Science, for her crucial contribution to the understanding of neutron stars with strong magnetic fields.

## Young Scientist Prize Winners – C20

### 2015 - Wei-Min Wang



After his Bachelor, Dr. Wei-Min Wang has been working on theoretical and numerical-simulation investigation on laser plasma physics, which is applied to advanced schemes of inertial confined fusion, laser-plasma based particle accelerators, and novel radiation sources from terahertz to gamma-rays. Dr. Wang got his Master from Institute of Applied Physics and Computational Mathematics, Beijing, China in 2006. He got his PhD from Institute of Physics, Chinese Academy of Sciences (CAS), Beijing, China in 2009 and then he became an Assistant research scientist in the institute immediately after graduation. In this year he won the S. T. Tsai award for excellent PhD thesis in plasma physics in China. In 2012, he became an Associate Research Scientist in Institute of Physics, CAS. He was an Alexander von Humboldt research fellow at Jülich Supercomputing Centre, Germany in 2014 and 2015, and a visiting scholar at Utsunomiya University, Japan in 2010 and Rutherford Appleton Laboratory, UK in 2008.

### 2014 - Mathieu Salanne



Dr. Mathieu graduated in 2004 from Chimie ParisTech and obtained his Ph.D. in 2006 from Pierre and Marie Curie University (Paris), on the topic of modelling of molten salts for generation 4 nuclear reactors. This work was performed in strong collaboration with Pr. Paul Madden at the University of Oxford.

After a post-doc at Paris Sud university he joined the PHENIX laboratory (<http://www.phenix.cnrs.fr/?lang=en>) as an associate professor in 2007, where he now heads the Electrochemistry and Ionic Liquids group. His main activities concern the modelling of ionic liquids and materials for energy applications. In particular, he elucidated the charging mechanism of realistic nanoporous carbon based supercapacitors using constant applied potential molecular dynamics simulations. Since 2014 he also holds a chair in computational physics at the Maison de la Simulation (<http://www.maisondelasimulation.fr/en/index.php>), which is devoted to the computer design of supercapacitor materials.

## Conference Report 2015

To give you a perspective on the wide range of new physics results that are presented at the IUPAP conferences, here is a very brief extract from the conference reports, featuring just one or two items because of space limitations. The selection was difficult and the omitted items are just as interesting. For more details see the individual conference websites.

At the conference on **Electromagnetic Interactions with Nucleons and Nuclei** held at Paphos, Cyprus from 11/1/2015 to 11/7/2015, new measurements on the proton radius were discussed.

At the **XXIX International Conference on Photonic, Electronic and Atomic Collisions** held at Toledo, Spain from 7/22/2015 to 7/28/2015, highlights included the successful implementation of attosecond UV-pump/UV-probe techniques to investigate ultrafast electron and nuclear dynamics in molecules.

The **International Conference on Electromagnetic Isotope Separators and Related Topics** held at Grand Rapids, Michigan, USA from 5/10/2015 to 5/16/2015 highlighted the use of low-energy beam manipulation techniques including beam cooling and radiofrequency ion transport.

At the **21st International Conference on Few-body Problems in Physics** held at Chicago, IL from 5/18/2015 to 5/22/2015, a number of important results were presented in the areas of atomic & molecular physics, few-nucleon dynamics, cluster properties of nuclei, and hadron physics.

At the **12th International Conference on Nucleus-Nucleus Collisions** held at Catania, Italy from 6/21/2015 to 6/26/2015, new and important works presented, included Quark Gluon Plasma production at LHC, and identification of  $Z > 112$  nuclei.

At the **13th international symposium on Origin of Matter and Evolution of Galaxies** held at Beijing, China from 6/24/2015 to 6/27/2015, highlights discussed included nucleosynthesis in the first stars, new results on  $^{12}\text{C}(\alpha, \gamma)^{16}\text{O}$  and  $^{12}\text{C}+^{12}\text{C}$  reaction rates.

At the **Materials and Mechanisms of Superconductivity 2015**, held at Geneva, Switzerland from 8/23/2015 to 8/28/2015, the recent discovery of superconductivity at 190 Kelvin in pressurized  $\text{H}_2\text{S}$ , and transient superconductivity close to room temperature using excitation with infrared light were discussed.



*Electromagnetic Interactions with Nucleons and Nuclei held at Paphos, Cyprus.*



*21st International Conference on Few-body Problems in Physics held at Chicago, IL.*



*International Symposium on Quantum Fluids and Solids, 2015 held at Niagara Falls, USA.*



*International Conference on Laser Spectroscopy 2015 at Singapore.*

At the **International Conference on Phenomena in Ionized Gases** held at Iasi, Romania from 7/26/2015 to 7/31/2015, new results presented included the use of plasma nanotechnology and new fabrication techniques including synthesis of nano-structured thin films, nano-tubes, nano-wires and nano-patterned surfaces.

At the **27th International Symposium on Lepton Photon Interactions at High Energies** held at Ljubljana, Slovenia from 8/17/2015 to 8/22/2015, highlights included the first results of LHC Run2 presented by ATLAS and CMS, and the pentaquark discovery by LHCb.

At the **International Symposium on Quantum Fluids and Solids, 2015** held at Niagara Falls, USA from 8/9/2015 to 8/15/2015, new results were reported by several investigators on the unusual crystal properties of solid  $^4\text{He}$ . In superfluid  $^3\text{He}$ , it was reported, surprisingly, that no Landau critical velocity was observed.

At the **International Conference on Laser Spectroscopy 2015** at Singapore held from 6/28/2015 to 7/3/2015, new results presented at the conference included improved accuracy and stability for atomic clocks and an updated electron dipole moment measurement.

At the **21st International Conference on Electronic Properties of Two-Dimensional Systems and 17th International Conference on Modulated Semiconductor Structures** jointly held at Sendai International Center, Sendai, Japan from 7/26/2015 to 7/31/2015, many new results on emerging two-dimensional materials other than graphene, such as molybdenum disulfide, phosphorene, silicene were discussed.

The **22nd International Colloquium on Magnetic Films and Surfaces** was held at Kraków/Cracow, Poland from 7/12/2015 to 7/17/2015. The ICMFS-2015 aimed at exchange of new results and ideas for advancing the field of magnetism at surfaces, interfaces, in micro- and nanostructures as well as of spin-dependent phenomena.

At the **Workshop on the determination of the fundamental constants** held at Eltville, Germany from 2/1/2015 to 2/6/2015, new data on the Rydberg constant, electron-to-proton mass ratio, the fine structure constant, the Planck and Avogadro constants, the electronic charge, the Boltzmann constant, and the Newtonian constant of gravity were presented.

## 2016 Conferences

The mission of IUPAP is to assist in the worldwide development of physics, to foster international cooperation in physics, and to help in the application of physics toward solving problems of concern to humanity. One of its means of fulfilling this mission is by sponsoring international meetings. The support rendered to these conferences takes up 44% of our budget.

The conferences supported by IUPAP for the year 2016 are:

### 1-13 March 2016

**9th International Meeting on Photodynamics and Related Aspects,** Mendoza

### 7-10 March 2016

**Sixth International Conference on Nanostructures,** Kish Island Iran

### 9-13 May 2016

**International Conference on Precision Physics of Simple Atomic Systems,** Jerusalem

### 30 May - 3 June 2016

**3rd PANDA Symposium on Multi-Wavelength Time Domain Astronomy,** China

### 12-25 June 2016

**African School on Electronic Structure Methods and Applications,** Accra

### 19-24 June 2016

**International Symposium on Nuclei in the Cosmos,** Nigata

### 27 June - 1 July 2016

**International Congress on Plasma Physics - 2016,** Kaohsiung

### 27 June - 9 July 2016

**SUSY (Supersymmetry) 2016,** Melbourne

### 4-9 July 2016

**XXVII International Conference on Neutrino Physics and Astrophysics,** London

### 10-14 July 2016

**International Conference on Computational Physics,** Gauteng

### 10-15 July 2016

**21st International Conference on General Relativity and Gravitation,** New York City

### 11-13 July 2016

**Nonequilibrium and nonlinear phenomena in statistical mechanics,** Brussels

### 11-15 July 2016

**International Laser Physics Workshop,** Yerevan

### 11-17 July 2016

**Contemporary Science Education and Challenges in the Present Society: perspectives in Physics Teaching and Learning,** Sao Paulo

### 13-15 July 2016

**International workshop on jamming and granular matter,** London

### 18-22 July 2016

**Identification of Dark Matter,** Sheffield

### 18-22 July 2016

**The 26th IUPAP International Conference on Statistical Physics,** Lyon

### 24-29 July 2016

**25th International Conference on Atomic Physics,** Seoul

### 25-29 July 2016

**14th International Conference on Integral Methods in Science and Engineering,** Padova

### 25-29 July 2016

**Entrepreneurship Development for Physicists,** Gujarat, India

### 25-29 July 2016

**Long-range interacting many-body systems: from atomic to astrophysical scales,** Trieste

### 31 July - 5 August 2016

**33rd International Conference on the Physics of Semiconductors,** Beijing

### 30 July - 7 August 2016

**COSPAR E1.9: Origin of Cosmic Rays,** Istanbul

### 1-19 August 2016

**The 4th Biennial African School of Fundamental Physics and Applications,** Kigali

### 3-10 August 2016

**International Conference on High Energy Physics,** Chicago

### 11-16 August 2016

**International Conference on Quantum Fluids and Solids,** Prague

### 25-29 August 2016

**19th International Symposium on Very High Cosmic Ray Interactions,** Dubna

### 5-8 September 2016

**25th European Cosmic Ray Symposium,** Torino

### 5-9 September 2016

**22nd International Congress on Acoustics,** Buenos Aires

### 11-16 September 2016

**International Conference on Nuclear Physics,** Adelaide

### 11-16 September 2016

**18th International Conference on the Physics of Highly Charged Ions,** Kielce

### 19-24 September 2016

**XXIII International Baldin Seminar on High Energy Physics,** Dubna

### 8-22 October 2016

**Mathematical Results in Quantum Theory: QMATH 13,** Atlanta

### 17-21 October 2016

**Joint ICO Topical Meeting and German Society for Applied Optics: [Integrated Polymer Optics and Photonics, from Research to Applications],** Hannover

### 2-5 December 2016

**22nd International Conference on Medical Physics,** Bangkok