International Union of Pure and Applied Physics

Newsletter

MARCH 2020

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

IUPAP Office hosted & supported by: **NANYANG TECHNOLOGICAL UNIVERSITY, SINGAPORE**

PRESIDENTS' NOTE

The next IUPAP General Assembly is approaching. We plan to hold it in Beijing from 12 to 15 of October 2020. Given the uncertainties introduced by the COVID-19 outbreak, we and our hosts are closely monitoring the implications for the date and location of our General Assembly.

This will be the last General Assembly (GA) before the General Assembly of the IUPAP Centenary. This is why we would like, in the 2020 General Assembly, to try to rejuvenate IUPAP functioning and missions, so that in 2023, we can celebrate both past achievements and the new start.

We will present in October 2020 new statutes and bylaws with updated missions and more modern functioning. The draft of the new statutes will be circulated to our members for their comments around about the time this Newsletter is published. We will also bring new practices for nominations for the Commissions which we have already started to implement informally.

We will make suggestions to incorporate more Young Scientists in IUPAP processes.

Having established an MoU on cooperation with the International Unions of Pure and Applied Chemistry, we will develop a strategy for more inter-union agreements, which will culminate in 2022 with the International Year of Basic Sciences for Sustainable Development, and hopefully remain after. Links with Physicists in Industry, and with industries which rely on physics are also being explored.

We will continue more vigorously our action in reducing the Gender Gap in Physics and empowering women in the Sciences.

Many of our members have developed policies on ethics in physics, and we plan to develop these ethical implications of international physics collaborations and other international relationships. We are also considering the implications of climate change for the work of IUPAP, and how physicists could reduce their CO2 footprint.

And last but not least, we would like to use the GA to discuss your expectations of IUPAP and how they could be implemented. This Newsletter is a call for contributions on this point. You can express your ideas through e-mail to the IUPAP secretariat office or through your liaison committee chair. We are already consulting the liaison chairs on their expectations of IUPAP and ways to implement them, and will continue this to collect any opinions from you.

All this, we hope, will help to attract New Members and to better serve our Members.

Michel Spiro
President of IUPAP
Chair, Steering Committee for the proclamation of IYBSSD 2022

Bruce McKellar
Past President

Silvina Ponce Dawson
Acting President Designate

ALEXANDER A KAMINSKII (1934 - 2019)

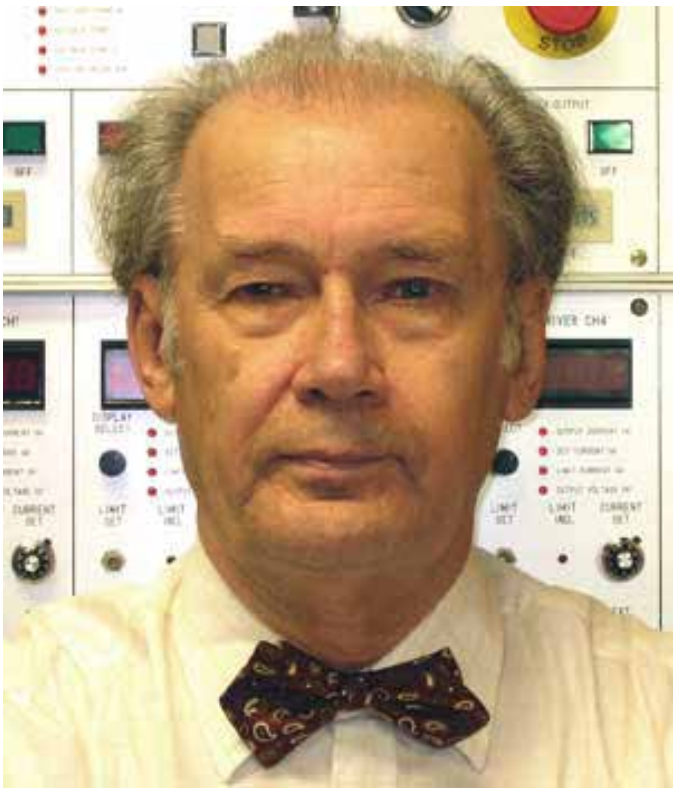
In Memoriam

Professor Alexander A. Kaminskii, known for his highly influential publications and books on laser crystals and related materials, died on 29 October 2019, soon after publishing his last papers.

Alexander A. Kaminskii was born in Moscow, USSR, on 23 October 1934. Alexander's father was politically repressed, so the family went to Kazan, which is located on the banks of the Volga River. Young Alexander entered Kazan Aviation University. Since he was always striving to engage in scientific activities, he dreamed of studying at Lomonosov Moscow State University. When government politics changed, he managed to move there. He found his way to become a prominent researcher and professor at internationally prestigious universities and institutes. In addition, he was appointed Corresponding Member of the Russian Academy of Sciences (RAS) and was head of a laboratory in the Shubnikov Institute of Crystallography in Moscow.

Prof. Kaminskii was a devoted scientist, who liked to express his research results on physical material quantities, especially optical wavelengths by precise numbers and units. He was not much interested in organizational tasks. He established international contacts in France, Germany (East and West), Japan, Poland, Spain and the United States of America, amongst others.

He did become involved in international organisations of science. He was a member of the Russian Delegation to the General Assemblies of the International Union of Pure and Applied Physics (IUPAP) and the International Council for Science (ICSU), and a member of the Optical Society of America (OSA). As a Vice-President at Large of IUPAP from 2008 to 2014, he played a key role in ensuring that Russia was actively involved in the work of the Union and



its Commissions. His contacts in the international science community were important contributions to science diplomacy, maintaining contacts between East and West, before and after the Iron Curtain was broken.

Prof. Kaminskii was among the first to recognize the power of empirical application of the Judd-Ofelt theory of crystal-field-induced radiative transition intensities among the energy levels of trivalent rare earth ions (RE3+) doped into dielectric crystals. Along with colleagues, especially Marvin Weber, Francois Auzel, Renata Reisfeld, and Alexandra M. Tkachuk, and others at the Lawrence Livermore National Laboratory, he created, and organized in his later books, a comprehensive database of Judd-Ofelt parameters, assisting researchers in the guided search for, and the interpretation of, the comparative performances of many interesting rare earth ion-doped laser crystals, such as neodymium-doped laser crystals. Later, this methodology was beneficially applied to the purposeful development of laser glasses doped with neodymium ions in support of inertial confinement fusion research, and to glass fibers doped with erbium ions in support of optical communication.

His cooperation with the later Institute of Optics and Atomic Physics of the Technical University Berlin (TUB) commenced during a workshop in Erice, Italy. A first joint paper on "Spectroscopic and laser properties of Er3+-doped monoclinic BaY2F8 single crystals" appeared in July 1990. In the following decade, articles on lamp and diode pumped solid state lasers were published. These led to many further international collaborations.

About 2000, A. A. Kaminskii and H. J. Eichler started a very fruitful cooperation on stimulated Raman scattering (SRS) in crystals. The first SRS experiments were done in the USA but there had always been a long tradition in Raman scattering in Russia where spontaneous scattering was observed first by Landsberg and Mandelstam, called "kombinatsionnoe" scattering. These studies allow building Raman lasers at nearly arbitrary wavelengths which are difficult to access with conventional solid state laser sources. The results support applications in modern laser technology. Frequency chains and ultrashort light pulses can be generated. The close cooperation was honored by the German Humboldt Foundation which supported him in research and to teach as a full Professor at the Optical Institute for several years. In the new millennium, Kaminskii discovered a new class of laser crystal materials, disordered crystals, which have broad spectra at low temperatures. Transparent ceramics were investigated in collaboration with the group of Prof. Ken-ichi Ueda in Japan. They developed fully transparent laser ceramics useful for high-power solid state lasers with 100 cm2 aperture. Prof. Kaminskii transferred his deep and significant knowledge to polycrystalline laser ceramics and opened a new route to large-scale crystalline lasers.

Alexander Kaminskii maintained a long-standing collaboration with editorial teams in scientific publishing, such as the physica status solidi journals published by Akademie-Verlag Berlin, later Wiley-VCH, as an author and as an active Editorial Advisory Board member since 1987. In 2007 he became one of the Founding Editors of the new Wiley-VCH journal Laser & Photonics Reviews and remained committed to the journal as an Editorial Advisory Board member and author.

In his scientific career, which lasted more than half a century, Prof. Kaminskii (co-)authored nearly 800 journal articles that gathered over 13000 citations, demonstrating his outstanding and pioneering work on laser crystals and nonlinear optics.
We have lost a high-level scientific partner and we miss the stimulating, but sometimes controversial discussions with him, not just about physics, but also on numerous other topics like politics, ethics, culture, and history. He was never short of anecdotes which could be funny or exciting, at times sad, and often included elements that caught us by surprise. We remember him with great respect for his work, determination and achievements, and especially for his contributions to our own science and our organisation.

Bruce H. J. McKellar, The University of Melbourne, Australia and International Union of Pure and Applied Physics

With contributions from

Hans Joachim Eichler, Oliver Lux and Hanjo Rhee, Institute of Optics and Atomic Physics, TU Berlin, Germany, Julian Findeisen, Robert Bosch GmbH, Stuttgart, Germany, Petra Becker-Bohatý and Ladislav Bohatý, Section of Crystallography, University of Cologne, Germany, William Krupke , Lawrence Livermore National Laboratory (retired), USA, Ken-ichi Ueda, Institute for Laser Science, University of Electro-Communications, Tokyo, Japan, Olga Alekseeva, Institute of Crystallography, Russian Academy of Science RAS, Moscow, Russia, Sergey Bagaev, Institute of Laser Physics, Siberian Branch of the RAS, Novosibirsk, Russia, Petr Zverev, Prokhorov General Physics Institute (GPI) of the RAS, Moscow, Russia, Ivan Sherbakov, Department of Physical Sciences of the RAS and GPI Moscow, Russia, Natayi L. Istomina, Department of Physical Sciences of the RAS, Russia, Vitaly Kveder, ISSP of the RAS, Russia and International Union of Pure and Applied Physics, Katja Paff and Stefan Hildebrandt, Editors-in-Chief, Laser & Photonics Reviews and physica status solidi, Wiley-VCH Verlag, Berlin, Germany.

An extended version of this obituary will be published in Laser & Photonics Reviews and physica status solidi (a).

INTERNATIONAL YEAR OF THE PERIODIC TABLE (IYPT) 2019

Bruce McKellar (Past President, IUPAP)

United Nations Educational, Scientific and Cultural Organization

2019 IYPT International Year of the Periodic Table of Chemical Elements

The International Year of the Periodic Table (IYPT) celebrates the 150th anniversary of Mendeleev's famous paper of 1869 setting out the periodicity of the chemical and physical properties of the elements, and showing that there were gaps in the structure, suggesting new elements were to be found. Finding those missing elements did not stop the search for yet more elements and more and more were found. This discovery process continues to the present day, and the IYPT celebrated all of those discoveries, especially the most recently recognised discoveries of elements Nihonium (113), Moscovium (115), Tennessine (117) and Oganesson (118).

It was an occasion to remember that all elements are made in nuclear reactions. For the elements that were already discovered by the 1930s, these reactions occurred in stars and in galaxies billions of years ago. For those that were discovered since 1940, staging the nuclear reaction is a part of the discovery process. A major IUPAP contribution to the celebrations was the public lecture Nuclear Physics and the Making of the Modern Periodic Table by Jim Al-Khalili at the International Nuclear Physics Conference 2019 celebrating the creation and discovery of the modern elements.

In Japan, great efforts were made to involve school students in understanding and celebrating the periodic table. One of the prizes given out at the closing ceremony in Tokyo went to a 10 year-old boy for his homemade two-dimensional periodic table, and he gave an amazing talk about his periodic table, which he started building when he was six to help him remember the table and the properties of the elements.

Science is a co-operative process, and a competitive process. Progress often needs co-operation, and personal, industrial and social rewards are competed for. It is no surprise that physicists and chemists co-operate and compete for the elements. The co-operation has been enhanced by the International Year of the Periodic Table, and I am confident it will continue.

QUANTUM LIGHT SOURCE ENGINEERING FOR QUANTUM COMPUTING

Chao-Yang Lu (2019 YSP winner – AC1)

Dr. Chao-Yang Lu from University of Science and Technology of China received the ICO-IUPAP Young Scientist Prize in Optics 2019 "for his significant contributions to optical quantum information sciences". After obtaining his PhD from the University of Cambridge in 2011, Dr. Lu and his team have been pioneering solid-state quantum light sources, multi-photon entanglement, quantum teleportation and quantum computing with photons.

A photonic quantum information processor usually consists of three parts: quantum light sources, linear optical network, and photon detection. Among these, the non-classical and non-linear quantum light sources, for example, single-photon sources and entangled-photon sources, represent the most challenging tasks. In the past two decades, extensive research efforts have been devoted into developing quantum light sources for scalable quantum technologies [1]. The key is how to compatibly combine all the checklists together into a single device, namely, high single-photon purity, indistinguishability, and efficiency.

Dr. Lu and his team developed pulsed resonance fluorescence in semiconductor InGaAs quantum dots to deterministically generate single photons with near-unity indistinguishability [2]. Further, by coupling the quantum dots to high-Purcell polarized micropillar, and using two-color coherent excitation, they produced pure and indistinguishable single photons with high extraction efficiency [3], free from laser background [4], and with single polarization [5]: a perfect single-photon source. Meanwhile, based on a broadband microcavity, Dr. Lu and his team developed deterministic quantum-dot based entangled photon sources with high efficiency and indistinguishability [6].

In a parallel route: non-linear optics, Dr. Lu and his team pushed entangled photon sources based on spontaneous parametric down-conversion to its physical limit. They demonstrated 6, 8,10 and 12-photon entanglement [7-10], and 18-qubit hyper-entanglement [11], along this road. Now, the entangled-photon sources simultaneously possess 97% efficiency and 96% indistinguishability.

Dr. Lu and his team systematically applied the novel quantum light sources in a series of fundamental quantum optics and quantum technology experiments. The single photons were used to perform astronomical-distance quantum interference with sunlight with 80% raw visibility, proving the quantum nature of thermal light [12]. They developed non-demolition single-photon detection and demonstrated quantum teleportation of single photons with multiple degrees of freedom [13] and high dimensions [14]. By doubly dressing a single quantum dot, they conclusively demonstrated the interference-induced spectral line elimination [15], a theory predicted by Zhu and Scully and waited. Dr. Lu was also the first to observe non-classical single-photon emission from atomically thin semiconductor crystals [16], opening a new line of research on quantum optics with two-dimension materials.

In the field of optical quantum computing, Dr. Lu and his team performed seminal experiments exploring the potential of linear optics quantum computing, including the first demonstration of Shor's algorithm [17], loss-tolerant quantum coding [18], simulation of anyonic statistics in Kitaev model [19], teleportation-based quantum CNOT gate [20], solving systems of linear equations [21], entanglement-based machine learning [22], cloud-based quantum computing [23], and topological quantum walk [24], pointing to future practical applications in code-breaking, big data, and quantum simulation. Emphasis has been placed on building quantum machines that can outperform classical computers for some specific tasks, a milestone termed as "quantum supremacy", for which boson sampling is a strong

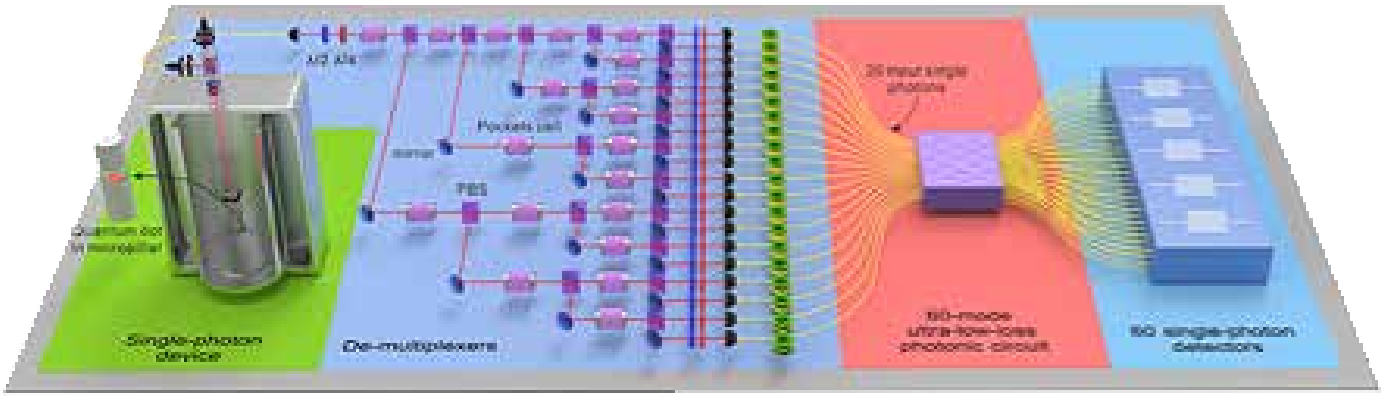


Fig. 1: Experimental set-up of boson sampling with 20 single photons in 60 modes. A single InGaAs quantum dot coupled to a microcavity is used to create pulsed resonance fluorescence single photons. 19 pairs of Pockels cells (PCs) and polarized beam splitters (PBSs) are used to actively translate a stream of photon pulses into 20 spatial modes. The 20 input photons are injected into a 3D integrated, 60-mode ultra-low-loss photonic circuit consisting of 396 beam splitters and 108 mirrors. Finally, the output single photons are detected by 60 superconducting nanowire single-photon detectors.

candidate. In 2017, they built a 5-photon boson sampling machine, which is 4-5 orders of magnitudes faster than before [25]. Recently Dr. Lu and his team reported boson sampling with 20 single photons injecting into 60-mode interferometer at a state space of 1014 [26]. In the near future, Dr. Lu aims to perform 30-50 photon quantum computing experiments, and build solid-state quantum entanglement-based networks.

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OPTICS AND APPLICATIONS TO SUSTAINABLE DEVELOPMENT (OPTISUD)

Mourad Zghal (C17)

The Optical Society of Tunisia organized in September 2019 a Topical Meeting on OPTIcs and Applications to SUstainable Development (OPTISUD) in Carthage, Tunisia. The workshop which was attended by more than 70 speakers, graduate and post-doctoral students from 24 countries was supported by the International Commission for Optics (ICO), The International Union of Pure and Applied Physics (IUPAP), the international society for optics and photonics (SPIE), the International Centre for Theoretical Physics (ICTP), the African Laser Centre (ALC), the Optical Society (OSA), and several other organizations. The event was the first joint ICO/IUPAP-C17 meeting.

The workshop was able to bring together international and African experts and researchers, and provide them with a state-of-the-art view of currently important research directions. Attendees had the opportunity to share information on new breakthroughs in the application of optics, photonics, and laser to environmental and biological problems and explore the commonality of interests and promote collaborations between international and African researchers, with special attention paid to promoting women in the research enterprise. The workshop was also an ideal occasion to help establish joint research projects among different participating institutions and enhance the international visibility and capacity of African science and technology. Topics in the conference sessions dealt with present or future applications of optics and photonics: Quantum optics, Nonlinear optics, Nanophotonics, Terahertz science, Photonic Metamaterials, Environmental applications, Industrial applications and material processing, Medical/Biomedical applications, Homeland security, and Optical communications.

In addition, a round table was organised on the use of photonics for economical and sustainable development. Attendees discussed how the data revolution (Big Data, Machine & Deep Learning) will impact the future of photonics, how developing countries could benefit from the emerging global market of photonics, and the scientific and engineering education programs and curriculums that need to be developed in our science and engineering universities. François Piuzzi from IUPAP-C13 commission presented a hands-on workshop using low-cost scientific instruments based on the use of open source paradigm and methods like: 3D-printing, reuse of components found in CD/DVD drive, laser-induced fluorescence by a blue ray laser which is very efficient for chlorophyll fluorescence excitation in plants leaves, and “frugal microscopes” based on a web camera and Arduino-powered stepping motors.

Through several small group meetings and individual discussions, OPTISUD has also allowed participants from IUPAP and ICO to discuss areas where the two parties could work together to promote the fields of optics, photonics and lasers. These talks have also increased our understanding of where each could complement the other.

Participants of OPTISUD 2019

INTERNATIONAL CONFERENCE OF PHYSICS STUDENTS 2019

Timo Eckstein and Monique Honsa

The International Conference of Physics Students (ICPS) traditionally takes place in the second week of August. It promotes an international and interdisciplinary physics community already at an early career stage. In 2019, more than 450 physics students travelled to the University of Cologne for a week of scientific and cultural exchange. As a core event of the International Association of Physics Students (IAPS), the ICPS is hosted by a different member of the IAPS every year. For many participants, ICPS may have been the first conference in their young scientific careers. The guest lecture by physics Nobel Prize Laureate Klaus von Klitzing provided the first highlight at the beginning of the conference. He spoke about the discovery of the quantum Hall effect as well as the new international system of units (SI) and joked that he is one of the two living constants besides Brian Josephson.

Besides guest lectures by renowned scientists, the participants themselves presented their own research projects in more than 250 student talks and almost 100 student posters. The thematic range of the conference stood out: from solid state physics, particle physics and optics to physics outreach, all areas of physics were represented.

Two excursion days offered the opportunity to explore several Fraunhofer and Max-Planck Institutes, the Research Centre at Jülich and the imperial city of Aachen. In addition, some participants had the opportunity to visit the European Astronaut Centre in which Germany’s first commander of the International Space station, Alexander Gerst, trains for his his mission, as well. In his guest lecture, ESA Director General Johann-Dietrich Wörner emphasized the outstanding importance of international

cooperation in astronautics with the words: "Our astronauts are not Italian or German, but European".

The conference also focused on the problems of sustainable energy supply. In a plenary lecture, Marc Timme from TU Dresden explained how mathematical models can be used to design a framework for the structure of energy networks. During a visit to the Zollverein coal mine industrial complex, a UNESCO world heritage site, the participants learned that coal mining cannot be economically viable when the total cost, for example, the follow-up costs due to the permanently required pumping capacity are taken into account. This applies regardless of the environmental imbalance, which makes the calculation even worse. In the opening lecture, Thomas Klinger, the scientific director of the world's largest stellarator Wendelstein 7-X, presented nuclear fusion as an alternative energy source. The aim of Wendelstein 7-X is to test how and whether fusion reactors can be operated economically.

A particular concern of the IAPS network and ICPS is to promote friendly exchange across national, ethnic, cultural, political or financial borders. To ensure this, 85 visa invitation letters were issued in advance for participants from 17 countries. The aim was to enable highly-motivated and excellent students from economically difficult backgrounds to participate. More than a dozen travel grants totalling to almost EUR 8000 were awarded.

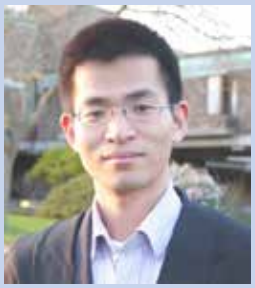
On 17th August the conference participants left Cologne with many new impressions, often exhausted but happy and with the certainty of wanting to see each other again at the next ICPS. In the long term, this exchange strengthens the international physics community through better networking and thus contributes to the further advancement of physics worldwide. This year, in 2020, ICPS will take place for the first time in its 35-year history outside of Europe, in Puebla de Zaragoza, Mexico, from 9th to 16th August, to which the registration has already started via scj.org.mx/icps/registration/.

Our sincere gratitude goes to the institutions that strongly supported ICPS 2019 and thus made the conference possible in its current extent. These are the Wilhelm and Else Heraeus Foundation, the German Federal Ministry of Education and Research, the Joachim Herz Foundation, the Klaus Tschira Foundation, the International Union of Pure and Applied Physics (IUPAP), the European Physical Society (EPS), the Dr. Karl May Foundation and the Dr. Hans Riegel Foundation.

Participants of the ICPS 2019; Credit: Stefano Ugliano

YOUNG SCIENTIST PRIZE WINNERS 2019

International Commission on Optics (AC1)



Chao-Yang Lu

"For significant contributions to Optical Quantum Sciences."

Chao-Yang Lu obtained his Bachelor's degree from the University of Science and Technology of China in 2004, and obtained his PhD in Physics from the Cavendish Laboratory, University of Cambridge in 2011. He was also a Junior Research Fellow of Churchill College. At Cavendish, he studied optical control of single electron spin confined in semiconductor quantum dots. Shortly after his PhD, he returned to China and became a Professor of Physics at the University of Science and Technology of China at the age of 28. His group currently focuses on quantum photonics, quantum computation, quantum communications, and quantum foundations. He has to-date published more than 80 articles in journals including Reviews of Modern Physics, Nature and its research journals, Science, PNAS, and PRL, with 9000 google citations. His work on quantum teleportation of multiple degrees of freedom of a single photon was selected as by Physics World as "Breakthrough of the Year". His work on single-photon sources, boson sampling, and astronomical-scale quantum interference was selected thrice, by Optics & Photonics News as "Optics in 2016, 2017, 2018". He has been previously awarded OSA Fellow, Nature's "Science Star of China", Fresnel Prize, Newcomb Cleveland Prize, Nishina Asian Award, Xplorer prize, and Huangkun Prize on Semiconductor Physics.

YOUNG SCIENTIST PRIZE WINNERS 2020

Commission on Structure and Dynamics of Condensed Matter (C10)

Andrea Young

"For his contribution on discoveries of correlated electron behavior in graphene in the strong quantum limit."

Dr Andrea Young, is an Associate Professor in the Departments of Physics at the University of California, Santa Barbara. He is a pioneer in the field of van der Waals heterostructures, which his group uses to realize and probe new phases of matter. Among his recent interests are manifestations of topology in correlated electron systems (particularly the emergence of unconventional quasiparticle statistics), the development of spatially resolved probes of magnetism and transport dynamics, and picosecond resolved spectroscopic probes of 2D heterostructures. Previously, Young was a postdoctoral fellow at the Massachusetts Institute of Technology (2012-2014), and a Visiting Scientist at the Weizmann Institute of Science (2014-2015). He holds a BA in Physics and Mathematics (2006) and a PhD in Physics (2012) from Columbia University

CONFERENCE REPORTS – 2019

The 11th International Conference on Inertial Fusion Sciences and Applications (IFSA Osaka 2019), held in Osaka, Japan from 22/09/2019 - 27/09/2019 covered many topics in the advanced performances of the laser-fusion plasmas including stagnation dynamics of the imploded core. Other topics discussed were; Advanced neutron, x-ray, and gamma-ray diagnostics; Advanced data analyses by AI; Advanced results in high-energy density physics; Advanced short-pulse, ultra-high-intensity, and high-repetition laser technologies. The conference was a big success. It was attended by more than 400 participants presenting 396 papers.

23rd International Conference on Acoustics (ICA 2019), held in Aachen, Germany from 09/09/2019 - 13/09/2019 was to promote international development and collaboration in all fields of acoustics. The main responsibility of the Commission through the years has been to convene the triennial International Congress on Acoustics (ICA) providing opportunities for the exchange of information, communicating and exchanging new ideas among the international acoustics communities. The conference included five interesting plenary lectures, two of which were delivered by female presenters.

16th International Conference on Topics in Astroparticle and Underground Physics (TAUP 2019), held in Toyama, Japan from 09/09/2019 - 13/09/2019 reported on the latest results of gravitational-wave observations. It was shown that during the first two observing runs known as O1 and O2, LIGO and Virgo had confidently detected gravitational waves from 10 binary black hole coalecenses and one binary neutron star inspiral. It was also reported that during O3, the current on-going third observing run, LIGO and Virgo have observed 26 candidate events so far. One of the highlights was a report on the first result of the KATRIN experiment. The conference attracted 538 physicists, the largest participation ever for the TAUP series.

6th International Conference on the Chemistry and Physics of Transactinide Elements (TAN - 2019), held in Wilhelmshaven, Germany from 25/08/2019 - 30/08/2019 discussed all aspects of the multifaceted research field and presented highlights on topics in atomic and nuclear physics as well as chemistry. The TAN19 conference featured a special symposium on the occasion of the International Year of the Periodic Table. The conference was endorsed by IUPAP and IUPAP president Spiro gave a welcome address.

2019 International Conference on Quantum Fluids and Solids (QFS2019), held in Alberta, Canada from 07/08/2019 - 13/08/2019 presented new results in the traditional areas of quantum fluids and solids. The presentations also included very interesting advances involving new techniques (superfluid optomechanics, carbon nanotube oscillators) to study superfluid helium films, cryogenic cooling techniques (e.g. melting of 3He-4He mixtures, quantum vortices and turbulence in superfluid helium, helium droplets and cold atom gases). In related areas like cold atom physics, there have been huge recent advances, particularly on achieving and studying "supersolid" phases. The overlap and interactions with these very active new fields added a great deal to the conference, stimulating much discussion and fruitful interactions.

29th International Meeting on Lepton and Photon Interactions held in Toronto, Canada from 05/08/2019 - 10/08/2019 had a thought-provoking presentation on diversity and academic/research community/climate from the perspective of under-represented minorities given by a local expert from the Toronto area. This provided an outsider's perspective on our field, that was very well received by the general audience and was referred to by later plenary speakers. The meeting participants were welcomed on to the traditional lands of the Canadian indigenous people by a local Chief. On the scientific side, the latest news from CERN, KEK and the CepC were presented in the opening session and prospects for future projects were presented in the closing session.

XXXI IUPAP Conference on Computational Physics (CCP 2019) held in Hong Kong from 28/07/2019 - 01/08/2019 focused on the first-principles lattice thermal transport calculations: achievements, challenges and strategies. Imaging the Supermassive Black Hole at the Center of the M87 Galaxy: A Computation Perspective. Accurate many-body methods for condensed phase problems. Topics of Two-Dimensional Materials and Their Heterostructures. On the "unreasonable" effectiveness of Advanced Lattice Boltzmann Methods for macroscopic Computational Fluid Dynamics. 2D materials for Bio-Sensing Universal Linear Scaling of Topological Phase Transition in Band Theory. Making the Data Revolution Happen Mechanisms of molecular machines. Comprehensive search for topological materials using symmetry indicators.

International Cosmic Ray Conference (ICRC 2019) held in Madison, Wisconsin, USA from 24/07/2019 - 01/08/2019 selected 19 presentations for highlight plenary talks to recognize the important progress made in all areas of astroparticle physics. Razmik Mirzoyan, presented breakthrough results from the MAGIC telescope Collaboration. He reported the observation of flare of high-energy gamma rays in coincidence with a Gamma Ray Burst. A strong flare was reported at energies of higher than 10 TeV. Dawn Williams of the University of Alabama gave a highlight talk about recent results from IceCube in neutrino astronomy and multi-messenger astronomy. She reported strong hints of the observation of tau neutrinos at very high energies

XXXIst International Conference on Photonic, Electronic and Atomic Collisions (ICPEAC 2019), held in Caen and Deauville, France from 23/07/2019 - 30/07/2019 attracted six satellite meetings which preceded or followed the main conference, including three new creations reflecting the dynamism of the topics dealt with in the research areas of ICPEAC. ICPEAC 2019 started at the Caen Normandie University on July 23, 2019 for the tutorials given by international experts and then from July 24 to 30, 2019 at the Deauville International Centre for the conference in itself. Unprecedented results were reported in fields as diverse as charged particle acceleration by intense lasers, induced damage in biological matter, electronic dynamics in nano-objects at the attosecond scale, antimatter physics, and physics of cold and ultra-cold collisions.

The 27th International Conference on Statistical Physics (StatPhys27), was held in Buenos Aires, Argentina, from 08/07/2019 - 12/07/2019. Organized triennially since 1948, StatPhys is the main conference of the IUPAP C3 commission. StatPhys27 covered a large variety of topics and included talks on how machine-learning techniques can improve atom based simulations, on recent efforts to sample the work distribution function in modern quantum simulators, on the out of equilibrium topological phenomena that underlie the dynamics of active fluids and on methods to unveil the geographic location of the spots that trigger epidemics, among many others. Special plenary sessions on Inclusion and Diversity in Physics and on Human Rights were organized. The conference also hosted the ceremony in which the prestigious Boltzmann Medal was given to Prof. Dr. H. Spohn (Technical University of Munich, Germany) and the Young Scientist Awards in Statistical Physics were given to Lucile Savary (ENS, Lyon, France), Alexandre Solon (Sorbonne Universite, Paris, France) and Manlio De Domenico (Fondazione Bruno Kessler, Italy). With over 700 participants from 42 different countries, 300 of whom came from Latin America, and 11 satellite meetings, the conference had a huge impact on the local and regional communities.

13th Edoardo Amaldi International Conference on Gravitational Waves, held in Valencia (Spain) from 07/07/2019 - 12/07/2019 has been showcasing since 2015, the observation of gravitational waves from coalescing compact objects. This is having a major impact in many fields of science, from astronomy and astrophysics to cosmology and fundamental physics. The 13th Edoardo Amaldi International Conference on Gravitational Waves reported on the status of the LIGO-Virgo detections as of July 2019; on the instruments and the science of future ground-based detectors; on the ongoing efforts in multi-messenger astrophysics with gravitational waves; on the future of Gravitational-Wave Astronomy with Pulsar Timing Arrays, and on the preparation for gravitational-wave detection from space with LISA, including a summary of the LISA Pathfinder results. Last but not least, the conference also included a public talk on "Einstein, black holes, and gravitational waves".

International Conference on Attosecond Science and Applications 2019 (ATTO), held in Szeged, Hungary from 01/07/2019 - 05/07/2019 showcased 94 oral presentations on the most recent advances in attosecond sciences. The contributed talks were selected by the international and local committees from the more than 300 submissions. All presentations were new and important in the field and some were presented as posters.

GIREP-ICPE-EPEC– Eötvös Year 2019 (Subtitle: Research and practice in physics education to celebrate Eötvös centenary) held in Budapest, Hungary from 01/07/2019 - 05/07/2019 offered a big opportunity to present scientific results, to communicate and discuss common research topics and best practices in the field of physics education. 7 keynote lectures, 10 Symposia, 11 Workshops, 173 Oral presentations, 76 Posters were presented. As a novelty, scientific visits (with provided buses) were added to the program. Participants could select from 5 venues - Paks Nuclear Power Plant; Wigner Research Centre for Physics & Center for Energy Research; Institute of Nuclear Techniques of BME & Institute for Computer Science and Control; Extreme Light Infrastructure-ALPS Research Institute and Low and Medium Level Radioactive Waste Management Site.

International Conference on Precision Physics and Fundamental Physics Constants (FFK-2019), held in Hungary from 09/06/2019 - 14/06/2019 focussed on 'gravity' on the occasion of the Eötvös Memorial Year in Hungary. The event devoted a whole day to the Eötvös experiment with three sessions and an exhibition at the conference site including a series of 3D posters and an original Eötvös torsion balance. A public talk was organised in Hungarian in the city of Veszprém on the Eötvös experiment. Exciting new results were presented on the topics: new SI units, muonic g-2 measurements, experiments at the LHC and other high-energy facilities, the proton size studied with electrons and muons, and tests of basic symmetry principles using theory and experiment.

The 7th International Large Hadron Collider Physics Conference (LHCP 2019), held in Puebla, Mexico from 20/05/2019 - 25/05/2019 reviewed the latest experimental and theoretical results from the LHC physics program given on the sessions of Standard Model Physics and Beyond, the Higgs Boson, Supersymmetry, Heavy Quark Physics, and Heavy Ion Physics. Unique international venue for lively scientific discussions focused on LHC physics, detector technology, upgrades, and future physics opportunities with emphasis on engaging early-career scientists and the public.

Second Regional Conference on Women in Physics (RCWIP), held in Kathmandu, Nepal from 27/03/2019 - 29/03/2019 had 2 sessions. Session I – Plasma Physics from Pakistan, presented on the topic of magnetic reconnection. Discussed about the change in magnetic topology in different astro-events like solar flare, prominences, auroras, sunspots and galactic magneto tails, etc; Session II – 'Gender Equality in Science and Engineering'. Gender equality is the demand, not only in physics but in all the fields of science and engineering, which is a major global problem. Challenges behind these are deeply-rooted gender bias, lack of confidence and balancing the career with family.

OPEN FOR NOMINATION

COMMISSION ON ATOMIC, MOLECULAR AND OPTICAL PHYSICS (C15)
YOUNG SCIENTIST PRIZE 2020

NOMINATIONS DUE 15th APRIL 2020

Nominations should be sent on or before 15 April 2020 to the C15 Chair (Prof Roberto Rivarola) by e-mail to rivarola@ifir-conicet.gov.ar

For information about the prize, please see:
https://iupap.org/c15-news/

COMMISSION ON COMPUTATIONAL PHYSICS (C20)
YOUNG SCIENTIST PRIZE 2020
NOMINATIONS DUE 30TH MARCH 2020

Nominations should be sent on or before 30 March 2020 to the C20 Chair (Prof David Landau) by e-mail to dlandau@uga.edu

For information about the prize, please see:
https://iupap.org/commissions/computational-physics/c20-news/

Nominations for IUPAP CERTIFICATE (LONG SERVICE)

IUPAP will be awarding a certificate of gratitude and appreciation to those who have given long and meritorious service to the Union.

Eligibility and details of the nominations can be found at:
https://iupap.org/news2/iupap-certificate-long-service/

All nominations are to be sent to the office at iupap.admin@ntu.edu.sg