

Reports from IUPAP Affiliated Commissions

for November Meeting, 2014

Collected by Cecilia Jarlskog

The reports here below are from

- AC.1. International Commission for Optics
- AC.2. International Commission on General Relativity and Gravitation
- AC.3. International Commission for Acoustics
- AC.4. International Commission on Medical Physics

AC.1.

TRIENNIAL REPORT OF THE ICO TO IUPAP

Duncan T. Moore, ICO President 2011-2014

Evolving With an Evolving World



Like any organization that thrives across more than a few decades, the ICO has grown and evolved to match the changes in the world in which it operates. It was founded as an affiliated commission of the International Union of Pure and Applied Physics in 1947, and since its inception, the ICO has grown to become a truly global society, including members from 52 territories around the world. Despite this success, we must constantly strive to expand the ICO to other members to offer them support for their optics endeavors, and to benefit in turn from the advances that will be made increasingly possible with cross-boundary collaborations. Last year at the ICO's Strategic Planning Committee Meeting in Tokyo, key proposals were set forth to help strengthen the international reach and nature of the organization.

Global economies continue to recover from some of the most challenging economic times that the world has faced since the ICO was founded. Aiding economies and creating jobs are among the greatest needs across the globe and must be a primary focus for the ICO now and in the years ahead. To that end, a number of ICO members, myself included, worked with the National Research Council last year to help lay out its review of the future of optics and critically, its economic impact, which can help the ICO to educate policy makers about the advantages of supporting optics and photonics research.

The Global Reach of the ICO

Former ICO President Anna Consortini once called the ICO “The United Nations of Optics.” The ICO has been devoted to bringing together optics researchers from around the globe since the first day it was founded, but as always, more can be done. One of the attributes that sets the ICO apart from other major optical organizations is that the ICO's annual meetings are held throughout the world instead of only within the borders

of the United States. At the 2013 Tokyo meeting, a great deal of discussion was given to ensuring our annual meeting would be held in a developing nation every third general assembly. This is something no other optics organization does, and is an endeavor the ICO must necessarily take upon itself, both for the good of the organization and the good of optics research as a whole.

Hosting in developing countries provides a unique opportunity for all members of the ICO. The prestige of hosting an international conference of this sort can bring a great deal of attention to optics in these countries, and helps raise the level of support for the researchers there. Many scientists conducting exceptional work in countries such as Cuba or Iran find it extremely difficult to meet scientists from the field from the U.S. and other developed countries for political reasons. Often, financial resources are limited, and travel isn't an option. By bringing the ICO into those countries, we foster the ability to talk directly with fellow researchers when we might not otherwise be able to. That exchange of knowledge will pay great dividends in the years to come.

The discussion of international reach included the way in which the ICO assesses dues, and while that may appear to be a minor consideration, it can have a profound effect on the success of optics and photonics programs in countries that are limited in the resources they can dedicate to optics research.

The first dues system was developed after the Second World War and was based strictly on population. It was updated several years later to the current system, which was designed to ensure that a country such as the U.S. does not dominate the commission, but that system has not kept pace with changes in demographics or research abilities.

A number of new algorithms for fee assessment are now under consideration. The exact formula is still being discussed, but they all take into account a combination of the gross national product of a country and the H-Factor of the country. GNP is used as an indicator of how productive a country is, and the H-Factor—a metric of frequency of citations—gives an indicator of the quality of the research being performed. With these two key indicators, representing quantity and quality, we believe we can create a method of determining fees in a way that is much more equitable across countries.

Photonics in the New ICO Objective

If inclusiveness was the theme of the Tokyo meeting, it certainly didn't stop at the issues surrounding political borders. Much discussion centered on the term "photonics" and whether photonics is a distinct discipline apart from optics, or whether optics is a wide umbrella that includes photonics. Clearly, this is an important question as it drives directly to the name of our organization. At length, the decision was made to keep the ICO's name intact but to rewrite the commission's objective statement to expressly include photonics.

The first sentence of the new ICO Objective is: “The objective of the International Commission for Optics (ICO) is to contribute, on an international basis, to the progress of the science of Optics and Photonics and its applications.” The entire objective statement likewise reflects the addition of photonics wherever applicable.

The Economics of Optics

Though most members of the American public stare at phone and computer displays hundreds of times a day, or use lighting and data storage, or benefit from medical science, far too few have a true awareness of the fundamental role optics and photonics plays in these technologies. The economic benefit of optics and photonics research to governments around the world needs to be underscored. An initiative to heighten general appreciation for our research by American and European countries can motivate other countries to launch their own campaigns to strengthen and support optics research and education.

In the 2013 edition of the National Research Council’s report, *Optics and Photonics, Essential Technologies for Our Nation*, the impact of the optics and photonics industry on the U.S. economy was considered in depth for the first time. For this report, economists were enlisted to properly catalog the effect our discipline has on national industry.

One of the key findings in the NRC’s report is the need for industry participation in furthering optics and photonics research. For both intellectual and financial reasons, industry cooperation is key to accelerating exploration with real-world implications, but given how broadly optics spans disciplines, smaller companies are more likely to be the participants than the larger firms of the past, such as the famed Bell Labs or Eastman Kodak. This dispersion of talent and resources makes meaningful collaborations more difficult.

Lastly, such consortia may not necessarily align well with the long-term research goals of basic-research-focused entities if industry plays the predominant role in setting the agenda. Given the clear benefits of working closely with industry, a way of mitigating the issues surrounding research consortia needs to be addressed. Economic opportunities will be hard to come by if R&D investment for long-term optics and photonics research is not coordinated at a national level, mitigating the risks to industry of far-horizon research aims and bringing together the wide array of photonics applications under a single, addressable umbrella.

To that end, the NRC report states: “Accordingly, the committee's judgment is that the time is overdue for a federal initiative in photonics that seeks to engage industry, academic, and government researchers and policy makers in the design and oversight of R&D and related programs that include federal as well as industry funding.”

Toward a National Photonics Initiative

Despite the ubiquitous and critical nature of optics and photonic applications in every aspect of modern life, data on the industry's output, employment, and R&D investment are not reported by U.S. government statistical agencies. The diversity of optics applications, while a demonstrated strength for the field, complicates accurate reporting and analysis of the field's economic impact. Even the government's own research investment dollars are not collectively measured, making it difficult to state the case that such investment has a measurable economic benefit to the nation.

Likewise, private organizations that monitor venture capital investment are limited in their scope of what constitutes photonics-based or photonics-enabled research because, like the U.S. government agencies, they have no umbrella definitions under which to categorize the myriad applications that optics impacts. As direct government investment gives way to industry-collaboration incentives, monitoring the private sector investment in photonics becomes increasingly crucial.

To overcome these issues, the NRC committee recommends that the federal government develop a *National Photonics Initiative* to collect all the academic, industrial, and government research data in one place, as well as enlist the researchers and policy makers to work together to lay out a properly integrated method of managing R&D spending on optics and photonics across all industries and government agencies. We on the committee believe, as do so many of us in the ICO, that our field is growing at an extremely rapid rate, with advances and applications that tend to be indicative of a nascent discipline, rather than a well-established one. That swift pace of progress comes in large part from the breadth of applications of which optics and photonics has been a key component over the last decade, but that same breadth of applications has impeded government and industry gaining an overarching grasp of the field. Without proper quantification of the impact of optics and photonics, it's difficult to chart a strategy to nurture the field on the large scale.

One key recommendation to improve the analysis of data in the optics and photonics sector is to develop a set of North American Industry Classification System (NAICS) codes that cover all aspects of the field. The NAICS is the standard used by federal agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy. Such a system would include the reporting of federal photonics-related R&D investment for all federal agencies and programs.

A national photonics initiative would not only aid all parties in measuring and monitoring

optics and photonics activity and impact, but it would also offer the federal government a tool to justify programs that provide matching funds for industry-led research consortia. By identifying critical technical priorities for long-term R&D funding, proper coordination across industries, academia, and government laboratories will allow for greater progress in the field. The committee even suggested an area that would likely win early interest and approval; large-scale data communications and storage. Using the National Nanotechnology Initiative as a template, we believe a National Photonics Initiative will have a dramatic effect on the state of U.S. optics and photonics R&D funding, which may then serve as a template for our members around the globe.

The International Year of Light

One last point I'd like to touch on in this report is a look toward the future; 2015 to be exact. I had the distinct privilege of presenting the proposal for the International Year of Light and Light-Based Technologies to the IUPAP General Assembly, which along with several international organizations, including the EPS, ICTP, and the LAM Network, supported the idea to the United Nations General Assembly. The assembly has officially proclaimed 2015 to be the International Year of Light, recognizing "the importance of light and light-based technologies in the lives of the citizens of the world and for the future of development of the global society on many levels." With the importance clearly demonstrated by the NRC report on how public awareness of optics and photonics is an important driver in the global economy as well as everyday life, it is tremendously exciting to have this opportunity right before us to reach the wider public and policymakers and demonstrate how our discipline plays—and will play—a vital role in the standards of living around the world.

The international optics community will realize that for them, and ICO, this is also the greatest opportunity in our lifetime to gain strong visibility and respect for optics as a separate discipline within the scientific community.

And for the general public, a year where the people are made aware of light's integral function in energy, climate change, communications, agriculture, architecture, archeology, entertainment, art, and culture will have a dramatic and far-reaching effect on how funding and research in our beloved field of optics and photonics is carried out in the decades to come.

It's truly an exciting time to be part of the ICO.

AC.2.

Report of Affiliated Commission AC.2 for 2013-14

Affiliated Commission AC.2 is the International Society on General Relativity and Gravitation (ISGRG).

Meetings: ISGRG meets triennially with our next meeting, GR21, scheduled for July 2016 at Columbia University in New York City. Preparations are already underway with the selection of the Scientific Organizing Committee chaired by Prof. Eric Poisson of Guelph University (Canada).

Young Scientist Prize: In 2014, we awarded the 2nd IUPAP General Relativity and Gravitation Young Scientist Prize to Dr. Jorge E. Santos of Stanford University and the University of Cambridge. The citation reads “For finding the first example of a classical gravitational instability of an asymptotically flat vacuum higher-dimensional black hole solution; for using numerical methods to construct novel anti-de Sitter black hole solutions and using these to explore the connections between gravitational systems and inhomogeneous strongly coupled condensed matter systems.” While Dr. Santos has already received his medal and check, the official presentation will be made at GR21 with travel funds for the 2014, 2015, and 2016 winners provided through the generosity of Prof. A. Ashtekar.

Centennial of General Relativity: On November 25, 1915, in Berlin, Albert Einstein presented for the first time the complete field equations for his theory of general relativity. ISGRG as well as gravitational physicists around the world are marking the centennial of this event in many ways. ISGRG has endorsed a conference to be held from 30 Nov to 5 Dec 2015 in Berlin (near the site of the original presentation). This will be our official celebration of the centennial. It is being organized jointly by the Max Planck Institutes for Gravitational Physics (Albert Einstein Institute) and the History of Science. The first part of the meeting will consist of reviews of current research frontiers in physics and astronomy that are impacted by general relativity. The second part will consist of a historical examination of the development of the theory and its integration into mainstream physics. See <http://www.aei.mpg.de/1569589> for additional information. We plan to maintain a list of other centennial activities by national general relativity organizations on our website, including regional meetings and public lectures,

as we hear about them.

Also in honor of the General Relativity centennial, ISGRG commissioned a volume of review articles by distinguished authors, edited by A. Ashtekar, B. Berger, J. Isenberg, and M. MacCallum, entitled “General Relativity and Gravitation: a Centennial Perspective.” The volume will be published by Cambridge University Press, is now in press, and should appear in June 2015. Any royalties will accrue to ISGRG to support its programs.

Finally, ISGRG has launched a Centennial Membership Drive to increase participation in our Society.

Gary Horowitz
ISGRG President (2013-2016)

AC.3.

Report from AC3 International Commission for Acoustics (ICA) to IUPAP C&CC Meeting in Singapore November 2014

1. ICA Governance The ICA comprises the acoustical societies from 47 member countries plus 8 international affiliate organizations which themselves have individual members distributed across the world and also organize international conferences every one or two years.

The revised governance arrangements agreed to at the 2013 General Assembly have encouraged greater involvement in the ICA activities. The first full meeting of the new board will be held in September at the time of an acoustics conference in Europe. The new board comprises representatives from the following countries: Australia, China, Germany, Canada and Spain in the executive, and Brazil, Denmark, France, Italy, Japan, Korea, Poland, Slovakia, UK and USA. Among the board are 3 females with one being the President.

2. Symposium Support Annually, the ICA provides support for specialist symposia which provide opportunities for those working in particular areas of acoustics to meet. The guidelines for selection require some international involvement and there is priority for developing countries. The meetings supported for 2014 include:

- 6th Congress of the Alps Adria Acoustics Association Graz, Austria
- XXV Encontro da Sociedade Brasileira de Acustica (SOBRAC) Campinas, Brazil
- Intl. Symposium on Musical Acoustics 2014 Le Mans, France
- 11th Intl. Congress on Noise as a Public Health Problem (ICBEN 2014) Nara, Japan
- 2nd Intl. Conference of the Acoustical Society of Nigeria (ASON 2014) Nsukka, Nigeria
- XXXI Symposium on Hydroacoustics Swinoujscie, Poland
- European Symposium on Smart Cities and Environmental Acoustics Murcia, Spain

In addition the ICA now provides the consolidation of the symposium support for the Acoustical Society of America and the following meeting was supported under that arrangement

- 12th School on Acousto-Optics and Applications Druskininkai, Lithuania

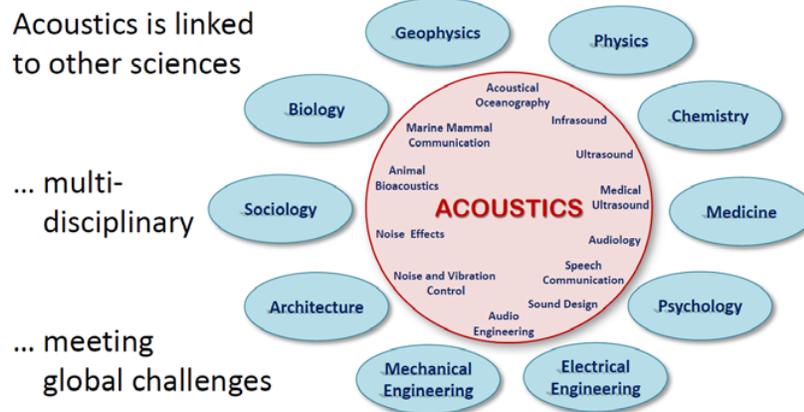
3. ICA Congress The major activity for the ICA is the congress held every 3 years. The last was held in Montreal, Canada in mid 2013 with 2300 registrants, over 1600 technical papers, and 49 Exposition booths, ICA 2013 was one of the biggest meetings in acoustics ever. We do not expect such a large attendance at the next ICA which will be held in Argentina in 2016.

4. International Year of Sound The ICA is continuing with the plans for the International Year of Sound in 2019. A steering committee and a working committee have been established and the time line is being formalized with advice from our colleagues who gained success in the bid for the International Year of Light. As well as support from the IUPAP we will also seek the support of the commissions within IUPAP that have some involvement of acoustics in their area. The poster below has

been used to promote the ICA and most recently was presented during the Expresso session at the ICSU General Assembly in New Zealand.

5. Early Career Awards and Young Scientist Grants The ICA allocates the majority of its annual budget to encourage acoustics activities. The selection process for the prestigious “ICA Early Career Award” will commence in 2015 for the presentation at the time of the 2016 congress. We expect to be able to award up to 30 “Young Scientist Conference Attendance Grants” for attendance at this congress and the selection will commence in late 2015 after the abstracts have been submitted.

Marion Burgess
ICA President 2013-2016



ICA promotes international development and collaboration in all fields of acoustics including research, development, education, and standardization

<p>47 national member societies from around the world</p>	<p>affiliated with</p> <ul style="list-style-type: none"> European Acoustics Association Iberoamerican Federation of Acoustics Western Pacific Acoustics Commission International Institute of Noise Control Engineering International Institute for Acoustics and Vibration International Congress on Ultrasonics International Commission on Biological Effects of Noise Audio Engineering Society 	<p>ICA Board</p> <p>President MARION BURGESS, Australia Vice-President JING TIAN, China Secretary-General MICHAEL STINSON, Canada Treasurer ANTONIO PEREZ LOPEZ, Spain Past-President MICHAEL VOGLANDER, Germany</p> <p>Brazil JÚLIO A. CORDIOLI Denmark DORTE HAMMERSHØJ France BERTRAND DUBUIS Italy ROBERTO POMPOLI Japan KOHEI YAMAMOTO Korea JEONG-GUON IH Poland GRAZYNA GRIEŁIŃSKA Slovakia MONICA RYCHTÁRIKOVÁ United Kingdom YIU LAM USA MARK HAMILTON</p>
<p>The International Commission for Acoustics (ICA) was instituted in 1951 as a sub-committee to the International Union of Pure and Applied Physics (IUPAP). The ICA in its new statutes held its first General Assembly in 1998. The ICA is a Scientific Associate of the International Council for Science (ICSU), an Affiliated Commission of the International Union of Pure and Applied Physics (IUPAP), and an Affiliated Organization of the International Union of Theoretical and Applied Mechanics (IUTAM).</p> <p>The major activity for the ICA is the triennial congress. The 2013 congress in Montreal was attended by over 2,200. The ICA provides support for Specialist Symposia and has an Early Career Award. The ICA is currently working towards an International Year of Sound in 2019.</p>	<p>ICASecGen@icacommission.org</p> <p>Next congress:</p> <p>www.ica2016.org.ar</p> <p>hosted by the Iberoamerican Federation of Acoustics (FIA) Association of Argentinean Acousticians (AdAA) in cooperation with Chilean Acoustics Society (SOCHA)</p>	

AC.4.



**International Union of Pure and Applied Physics (IUPAP)
Affiliated Commission AC4: Medical Physics
[International Commission on Medical Physics Committee, IComMP]**

Fridtjof Nüsslin, Chair

Report on Activities from Oct-2013 to Oct-2014

Background

The International Organization for Medical Physics (IOMP) represents over near 20,000 medical physicists worldwide and has 84 national member organizations. The mission of IOMP is to advance medical physics practice worldwide by disseminating scientific and technical information, fostering the educational and professional development of medical physics and promoting the highest quality medical services for patients.

Medical Physics is a branch of Applied Physics that applies scientific principles, methods and techniques in practice and research for the prevention, diagnosis and treatment of human diseases with the specific goal of improving human health and well-being. The profession Medical Physicist has been recognized by the International Labor Organization (ILO) in 2010 as a professional group listed in the ILO classification system ISCO-08 under '*Physicists and Astronomers*'. To strengthen Medical Physics science within IOMP and to link IOMP to IUPAP the International Commission on Medical Physics (IComMP) has been established which has been approved as IUPAP Affiliated Commission AC4.

Objectives of AC4:

- (1) to promote medical physics in its scientific and professional aspects in the physics community by interaction with the IUPAP commissions,
- (2) to specifically link to the C6 commission "Biological Physics" ,
- (3) to apply for support of the ICMP congress series,
- (4) to participate in the IUPAP Young Scientist Award program

Mission of AC 4:

The mission of IOMP is to advance medical physics practice worldwide by disseminating scientific and technical information, fostering the educational and professional development of medical physicists, and promoting the highest quality medical services for patients.

Membership of AC4

IOMP Officers:

Kin Yin Cheung (President IOMP)
Slavik Tabakov (Vice-President)
Fridtjof Nüsslin (Past-President IOMP, Chair IComMP/AC-4)
Madan Rehani (Secretary General IOMP)
Anchali Krisanachinda (Treasurer)

IOMP Committee Chairs

Geoffrey Ibbott (Science, SC)
John Damilakis (Education & Training, ETC)
Raymond Wu (Professional Relations, PRC)
Tae Suk Suh (Publication, PC)

Associate Members from IUPAP Commissions:

Kenichi Yoshikawa (Chair C6, Biological Physics)
Paulo Murilo de Castro Oliveira (C13, Physics for Development)
Robert Lambourne (C14, Physics Education)

3 external scientists co-opted by IComMP

Selected Activities

1. International Conference on Medical Physics (ICMP13):
In remembrance of the foundation of the IOMP 50 years ago, the 20th International Conference on Medical Physics (ICMP2013) was hosted by the UK medical physics organization IPEM on behalf of IOMP in Brighton. Additional to several historic sessions the program covered the wide spectrum of medical physics science like imaging, radiotherapy, nuclear medicine, radiation measurement and protection, biomaterials, nanoparticles, ultrasound, laser, microscopy, modeling & simulation, instrumentation, and many more. This highly successful, four-day event was attended by 835 people and featured 312 international speakers, 212 posters and an exhibition.
2. Symposium on the Development of Medical Physics in Africa held in Brighton
As an initial action of the long term project recently launched by the IOMP, a workshop on the current situation and limitations of Medical Physics in Africa has been organized jointly with the IOMP, IUPAP-AC4 and FAMPO (Reg.Organisation of the IOMP in Africa). It was attended by about 60 delegates from 11 African countries (total 100 participants). Furthermore, the WHO and the IAEA were contributing. Based on the meeting papers and the panel discussion an action plan has been developed. The workshop was kindly supported by the IUPAP Congress Sponsoring Program, the funding was exclusively used for travel grants of delegates from Africa.
3. AC 4 meeting in Brighton:
An AC4-business meeting was held at the ICMP13 conference in Brighton and attended by 10 members.
4. Joint Symposium IUPAP AC 4 & C 6 in Brighton:
A very successful symposium crosslinking biological (C6) and medical physics (AC4) has been organized by the Chairs of both commissions (Y.Kenichi-C6, F.Nüsslin AC4). Under the title “*From Molecules to Life*” concepts and future joint research activities in both areas applied in diagnostics and therapy have been discussed.
5. Young Scientists Award 2012 & 2013
The winners of the IUPAP Young Scientist Prize, **Dr. Magdalena Stoeva**, Associate Professor in the Medical University, Plovdiv, Bulgaria, and **Dr. Ferdinand Schweser**, Research Associate in the Medical Physics Group at the Friedrich Schiller University, Jena, Germany, have been awarded in a short ceremony at the IOMP Reception event in Brighton. (Details of the awardees have been given in the last report).
6. Young Scientist Award 2014: The call for nominations has been published (deadline 30th November 2014)
7. International Day of Medical Physics:
For the first time the *International Day of Medical Physics* has been celebrated simultaneously in various countries around the world at the 7th Novembre 2013 in remembrance of the birthday of Marie Sklodowska Curie (7.11.1867). Key events have been the ceremonies in Poland and in Paris, both historic locations linked to the life of Marie S. Curie. Several national and regional organizations of the IOMP are planning to organize this year again events, lectures, symposia mainly aiming to attract the science community at large and the public.
8. Medical Physics International – New web IOMP Journal:
Following the first issue of *Medical Physics International*, the official Journal of IOMP, (Editors S.Tabakov & P.Sprawls) published in 2013, now the 4th issue is available at http://mpijournal.org/content_currentissue.aspx

9. *Certification of Medical Physicists*: The deficit of qualified medical physicists, particularly in the developing countries, is a major limitation in providing high quality service in health care. In 2010 the *International Medical Physics Certification Board (IMPCB)* has been founded. Its main objectives are definition of minimum professional standards, establishing proper infrastructures, conducting examinations, maintaining a registry of holders of a certificate and to provide a system of continuing education & training for certified medical physicists. In 2013 the IMPCB started its implementation phase by electing its staff and board members.
10. *Cooperation with the International Centre for Theoretical Physics in Trieste (ICTP)*: Since 2002 the International Medical Physics College was adopted as a regular program of the ICTP. It has developed a recognized activity providing education in medical physics in the developing countries. As a most recent action, a MSc course in medical physics was launched at the beginning of 2014 and now educates the first cohort of students from developing countries. IOMP supported the course from the very beginning and now for the second academic year they have a staggering number of 440 applications.
11. *IOMP Women in Medical Physics Group*: Historically as well today women play an important role in medical physics, and in many hospitals women is the majority of the medical physics staff. Hence, the IOMP decided to form a group Women in Medical Physics (Associate Chair: Magdalena Stoeva) to strengthen the role of female professionals in our community.
12. *World Congress in Medical Physics and Biomedical Engineering 2015*: WC2015 will be held on 7-12 June 2015 in Toronto. Paper submission will be open these days (see www.wc2015.org)

Munich, 07 October 2014

Fridtjof Nüsslin
Chair AC-4
Past-President IOMP