Activities of the International Committee for Future Accelerators (ICFA)

September 2014 – September 2015

Roy Rubinstein – ICFA Secretary

1. Introduction

During the past year there were three ICFA meetings: on 27 October 2014 during the ICFA Seminar in Beijing; on 26/27 February 2015 in Newport News, USA; and on 19 August 2015 in Ljubljana, Slovenia, during the Lepton-Photon Symposium. At the February meeting, which is the major annual ICFA meeting, directors of the world's leading particle physics laboratories are also invited, as has been the practice for the past ~ 2 decades. This allows a more extensive discussion of both the current and the future status of particle physics.

The current ICFA membership is given in Appendix I.

2. International Linear Collider (ILC)

The Linear Collider Collaboration (LCC) under ICFA's Linear Collider Board (LCB) continues to work with the ILC Project Office at KEK on specific issues for the Japanese preferred ILC site. The LCC continues to provide input for the Japanese government bodies studying the possibility of hosting the ILC, and also interacts with labs and funding agencies around the world to further the realization of the ILC.

A Japanese Advisory Panel on the ILC has issued an interim report, which includes the recommendation to share costs internationally; the need for a clear vision on the discovery potential for new particles; the need to monitor closely LHC Run II data; the need to mitigate project cost risk; and the need to have public and science community understanding of the project. ICFA is producing a detailed reply to the Panel addressing these issues.

The LCB has produced a document on suggested governance of an ILC laboratory, and this will be sent to the appropriate Japanese government bodies.

During the past year, industrial superconducting RF cavity gradients have almost reached the ILC specified gradient of 31.5 MV/m, and the ATF2 test facility at KEK has almost achieved a beam spot size which corresponds to the desired ILC goal of 6 nm.

There have been some ILC design changes since the 2013 TDR, some specific to the Japanese preferred site; they include a common L* for both detectors; vertical access to the IR; and a ~ 1.5 km extension of each accelerator tunnel for timing and

redundancy. A running scenario has been produced to optimize the physics output of the ILC, with the understanding that any actual running scenario will depend on then-available LHC and ILC physics results.

A review of the ILC status was held on 13/14 April 2015 at LAL, Orsay, by the LCB's Project Advisory Committee.

The current LCB mandate (and that of the LCC) expires in February 2016; ICFA has extended both until the end of 2016, and during 2016 will review the membership and mandates of both of these bodies.

3. ICFA Seminar

ICFA Seminars are held every three years, and the 11th of this series took place in IHEP, Beijing on 27-31 October 2014. With an invited attendance of 150-200 leading members of the fields of accelerator and particle physics and related topics, these Seminars allow an international exchange of information on plans for future facilities in the field of particle physics; representatives of government funding agencies and the media are also invited.

Following the 2014 Seminar, ICFA concluded that these Seminars continue to be valuable, and the 2017 Seminar will be held in Vancouver.

4. Proposed IUPAP Working Group on Accelerator Science

A new IUPAP Working Group on Accelerator Science has been proposed. Since ICFA is an existing IUPAP Working Group involved in accelerator-related issues, it was asked for comments on the proposal. ICFA's views are summarized in the following:

- ICFA represents the major labs worldwide that carry out research at the energy frontier
- ICFA has well-established Panels very relevant to many aspects, including generic, of accelerator R&D
- ICFA would welcome a new IUPAP working group which covers a broader area of accelerators than ICFA itself does; the new group should have links to ICFA and duplication should be avoided
- ICFA Panels can be a bridge to the new group.

An interim working group is being set up by IUPAP to propose a charge and initial membership of the new Working Group, and ICFA has been asked for nominations to the interim working group.

5. Proposed ICFA Panel on Sustainable Accelerators and Colliders

There is a proposal for an ICFA Panel on Sustainable Accelerators and Colliders; the goal of the proposed Panel is to improve the power efficiency of every accelerator component; to have energy recovery from the accelerator; to re-use the recovered energy; and to have a stand-alone system to provide all or part of the accelerator

power needs. An ICFA subgroup was asked to look at existing initiatives in this area and, if appropriate, to produce a possible mandate and goal for such an ICFA Panel.

6. Reports

Reports were presented to ICFA meetings on the activities of ICFA's Panels; the ICFA/ICUIL collaboration on particle acceleration by lasers; the current status of studies for very large circular accelerators in China and Europe; and activities at each country and lab represented at the meeting. There were also reports given on InterAction (the particle physics communicators' organization) and on FALC (Funding Agencies for Large Colliders) activities.

Appendix I

ICFA MEMBERSHIP

September 2015

CERN Member States

H. Abramowicz
R. Heuer
J. Mnich (Chair)

USA

N. Lockyer
D. MacFarlane
I. Shipsey

Japan

T. Mori
M. Yamauchi

Russia

A. Bondar
S. Ivanov

Canada

M. Roney

China

Y. Wang

Other Countries

M. Cho
L. de Paula
V. Matveev

C11

J. Fuster

(Secretary: R. Rubinstein)

The members of the Working Group on Communication in Physics are listed below. Each has an interest in physics communication issues, and in many cases have strong connections with physics society publications. The group has been meeting yearly, with meetings in 2012 in CERN and 2013 in Ridge, NY. In 2014, we have a virtual meeting scheduled. The current members are:

Gene Sprouse (Chair)
Editor in Chief, American Physical Society
Ridge, NY

Xavier Bouju
CEMS/CRNS
Toulouse, France

Enrique Canessa
Abdus Salam ICTP
Trieste, Italy

Nicola Gulley
Editorial Director
Institute of Physics Publishing
Bristol, U.K

Li Lu
Professor and Deputy Director
Institute of Physics, Chinese Academy of Sciences
Beijing, China

Sergio M Rezende
Professor of Physics at the Universidade Federal de Pernambuco
Former Minister for Science and Technology of Brasil (2005-2010).

Ken-Ichi Ueda
Institute for Laser Science
Tokyo, Japan

Jens Vigen
Head Librarian(CERN).
Geneva, Switzerland

In 2012, our group had extensive discussions about researcher identifiers, and has made a proposal for the General Assembly to endorse ORCID. ORCID is an open, non-profit, community-based effort to provide a registry of unique researcher identifiers and a transparent method of linking research activities and outputs to these identifiers. ORCID is unique in its ability to reach across disciplines, research sectors, and national boundaries and its cooperation with other identifier systems. Our group proposed the following statement to be adopted by the IUPAP General Assembly:

Statement to the IUPAP Council from the Working Group on communication in physics

The IUPAP Working Group for Communication in Physics acknowledges the long-standing problem of accurately linking researchers with their professional activities, and fully supports ORCID's efforts to create a registry of researcher identifiers and embed these within research workflows.

To support the adoption of ORCID, the Working Group recommends that IUPAP encourage the physics community to adopt ORCID:

- as individuals, by registering for ORCID identifiers(IDs);
- as member organizations, by joining ORCID and integrating ORCID IDs into workflows, for example by
    - a) integrating ORCID IDs into member registration processes;
    - b) integrating ORCID IDs into manuscript submission processes; and
    - c) informing their members of the advantage to them and their community of linking their scholarly activity to their ORCID ID.

In 2013, the Working Group turned its attention to the issue of Data. We met with Chris Biemesdorfer from the AAS, who explained to us various initiatives in Astronomy and other physics fields. After extensive discussions and reports from each member of the committee concerning how data issues are viewed in their location, we developed the following proposal to the IUPAP General Assembly:

Statement to the IUPAP Council from the Working Group on communication in physics.

The working group were asked to consider the benefits and challenges to making research data open for wider reuse. The group recommends that to facilitate the discussions there should be a preferred definition to define data. We propose the following definitions:

Level 0 data – raw data, unprocessed

Level 1 – convert data to standard units; some initial calibrations

Level 2 – some data analysis, such as fit to curves, calibrations etc. Generally the data that will be supporting any figures in published articles and reports

Using this definition the group recommends that Level 2 data could be a good candidate for making openly available. Level 1 and Level 0 data require supporting information and formatting to be of most use and to facilitate accessibility.

There are many good examples of research communities sharing data well and integrating it into publication practices. Data supplementing articles is being published across disciplines, and in the life sciences mandatory publication of data for reproducibility already underpins several disciplines/journals. Research communities such as Astronomy and High Energy Physics have established formatting, linking and archiving protocols for data. However this is not the case across all areas of physics. The working group recognises that there are a number of initiatives and new publications emerging that help to bridge the gaps between the raw data classed as level 0 and the fully processed data at level 2 and that these should be monitored; new services emerging also provide suitable options for authors to index and store their data but the current landscape is still very fragmented.

In conclusion we recommend that IUPAP invite the physics community to provide, whenever and however possible, these data whilst recognising that this will be more complex in some areas than others, with additional supplementary information such as software, for example, required in some cases.

The publishing and library communities can play an instrumental role in this process in designing submission processes and guidelines together with linking mechanisms that can lead to more robust management, discoverability and archiving of the data. The benefits of this would contribute significantly to reducing duplication of effort at a later stage in the future.

We also recognise that by making data available researchers need some assurance that ethical practices will be adopted by others when making use of their data, abiding by any embargo periods or restrictions that may be imposed due to the nature of the data, and suitably acknowledging the original authors.

Activities of the Working Group on Women in Physics (Working Group 5)

September 2014 – September 2015

Irvy (Igle) Gledhill (Chair of IUPAP WIP)

Globally, the involvement of women and girls in physics is very different across countries and is still limited in most of them. Although progress has been made, much remains to be done.

1. IUPAP International Conference on Women in Physics

The conference is the major mechanism adopted by IUPAP, through its Working Group on Women in Physics, to foster the advancement of women in physics, and the attraction of girls into physics, across the world.

Although the 5th ICWIP was held in Waterloo, Canada, August 5-9, 2014, and was reported on in the previous annual cycle, it has relevance in this report. Over 200 physicists from 52 countries participated, including, notably, from 16 African countries. The Working Group raised funds to cover full Travel Grants for 45 participants from 36 developing countries.

Workshops were organised by the Working Group Members, and each Workshop formulated actions relevant to its focus area. These were combined in a Plenary Session into a set of Resolutions for the Working Group. From these, a Resolution was formulated which was forwarded for consideration by the General Assembly in Singapore in November 2015.

Outputs from the conference include the results of a new initiative called "My STEM Story," which encouraged women physicists to share their experiences online in the form of personal stories, essays, poems, pictures and videos. The Conference Proceedings are to be published by AIP (American Institute of Physics) and are in the editorial process. Workshop summaries are included as papers.

Organisation of ICWIP2017 is under way. The conference will be held in Birmingham, in the UK, in May 2017.

2. 28th General Assembly (GA)

The GA resolved to extend the work of Working Group 5 for 3 years, and charged the WG to organise the 6th IUPAP International Conference on Women in Physics. The GA also resolved to endorse an annual International Women in Physics Day.

3. Global Survey of Physicists

The second major mechanism adopted by the Working Group has been the Global Survey of Physicists, conducted in 2010. Global results had been presented in 2010, but detailed analysis of 8 countries was presented in Canada. This survey, carried out by the American Institute of Physics, was remarkable for having 14932 respondents in 8 languages. The survey has provided significant data on differences in the experiences, and access to resources, of men and women, and in highly developed and less developed countries. The ICWIP conference resolved to find ways of pursuing follow-up surveys in future; the chief barrier is funding.

4. Travel Grants

IUPAP Travel Grants were established to give an opportunity to women physicists who might not otherwise be able to attend a regional or international conference. In the 2015 year 103 applications were received and approximately 20 grants have been allocated.

5. Working Group meetings

The next meeting of the Working Group is planned for Birmingham, UK, in May 2016. Primary objectives are sourcing funding to support delegates from developing countries with Travel Grants for ICWIP2017, forming and confirming Country Teams, proposing a date for International Day of Women in Physics to IUPAP, and taking action to start the new phase of the Global Survey of Physicists.

6. The Waterloo Statement on Women in Physics

Following the lead of the astronomers, the physicists have drafted a statement on best practice in institutional policy and departmental strategy in fostering diversity. The present draft is being prepared for comment by a reference group, which will include country representatives, IUPAP representatives, and interested institutional representatives.

ICUIL
INTERNATIONAL COMMITTEE FOR ULTRA-HIGH INTENSITY LASERS

Annual Report to IUPAP
September 2015

www.ICUIL.org

ICUIL Activity Overview

ICUIL continues to be engaged with the advancement of the international field of ultra-high intensity lasers. Our goals are to provide a venue for discussions, among representatives of high-intensity laser facilities and members of user communities, on international collaborative activities such as the development of the next generation of ultra-high intensity lasers, exploration of new areas of fundamental and applied research, and formation of a global research network for access to advanced facilities by users. As described in this report, ICUIL continues to be active in promoting collaborations required to establish high-intensity laser infrastructures for the benefit of the international physics community. This activity overview highlights international progress made by members of the ICUIL community in 2014 to 2015.

Laser facilities around the world continue to push towards multi-petawatt power capability. For example, the Chinese initiative at the Shanghai Institute of Optics and Fine Mechanics (SIOM) is advancing rapidly towards a 10 PW laser facility. Lawrence Livermore National Laboratory (LLNL) is in the process of commissioning their Advanced Radiographic Capability (ARC) PW scale laser and the PETAL laser at CEA will begin operations at the 2 PW level this year. The University of Rochester's Laboratory for Laser Energetics announced its OPAL multi-phase laser initiative that could lead towards a 75 PW capability. In addition, the European ESFRI roadmap project, the Extreme Light Infrastructure (ELI), consisting of ELI-Beamlines, ELI-Nuclear Physics, and ELI-ALPS (attosecond science pillar), is moving towards an initial operation date of 2018.

ICUIL and ICFA (International Committee for Future Accelerators), another arm of the IUPAP Working Groups, are continually collaborating for the laser-driven wakefield acceleration for the purpose of future high energy accelerators. Since the publication of the ICUIL-ICFA Joint Taskforce Report on the laser accelerators in Dec. 2011, we tried to address the Report's findings. One of the main points is the need to improve the laser technology, in particular in its efficiency and repetition rate, so that the beam generated will have high enough luminosity. Along this line, the ICUIL community has invented the CAN laser technology based on the fiber laser technology. The progress on this technology push has been reported at the ICFA General Assembly at the Jefferson Lab at Newport News in Feb. 2015 by T. Tajima. In addition, with the CAN laser having high rep rate and high efficiency, additional important applications have been found, including the driver for the management of space debris (see Sec. IV of this Report). These will be further reviewed at the IZEST Conference at CERN this October. This will be another giant step in collaboration between the communities of ICUIL and ICFA. The possibility of future collaboration on high fluency laser technology at CERN will be discussed. In addition to the ICUIL-ICFA collaboration, ICUIL is happy to help send our members (ex officio) to the new toddler of our sister Working Group in Accelerator Science under the guidance of IUPAP. We continue to collaborate with the Asian Intense Laser Network and we sponsor the Russian Summer School on Intense Lasers to promote the young generation in furthering the reach of high intensity lasers.

International Teleconferences

Periodic teleconferences held throughout the year continue to be effective in maintaining progress in each of the primary activities below.

- ICUIL Newsletter

ICUIL continues to achieve its goal of publishing an annual newsletter. The sixth ICUIL Newsletter (Volume 6) was sent out to the high intensity laser community in June 2015 and is also available at the ICUIL website. The chief editor, Alexander Sergeev, managed the illustration and publication resources to distribute an eight-page newsletter to hundreds of readers, highlighting the major laser construction and laser science projects within the HIL community, major conferences, and related workshops.

- ICUIL Website

One of the features of the ICUIL website is an interactive world map that highlights the high intensity laser facilities around the world as shown below. Surveys of the worldwide laser community are conducted by ICUIL in an effort to provide an accurate accounting of all existing and planned ultrahigh intensity laser facilities that are capable of reaching intensities above 10^{19} W/cm^2. An updated survey will be implemented at the 2016 ICUIL conference next year.

- ICUIL Charter

The bylaws of the ICUIL Charter are being revised to maintain the experience and dedication of the current membership that has been assembled over the last decade. More than two terms of service would be allowed for members who continue to be active in this field and are able to provide service to the ICUIL community. A vote on the revised charter is anticipated to occur at the 2016 General Assembly meeting. A more gradual member rotation will be used to maintain continuity and ensure that ICUIL continues to advance while maintaining balance both geographically and between the various high field science working groups of IUPAP.

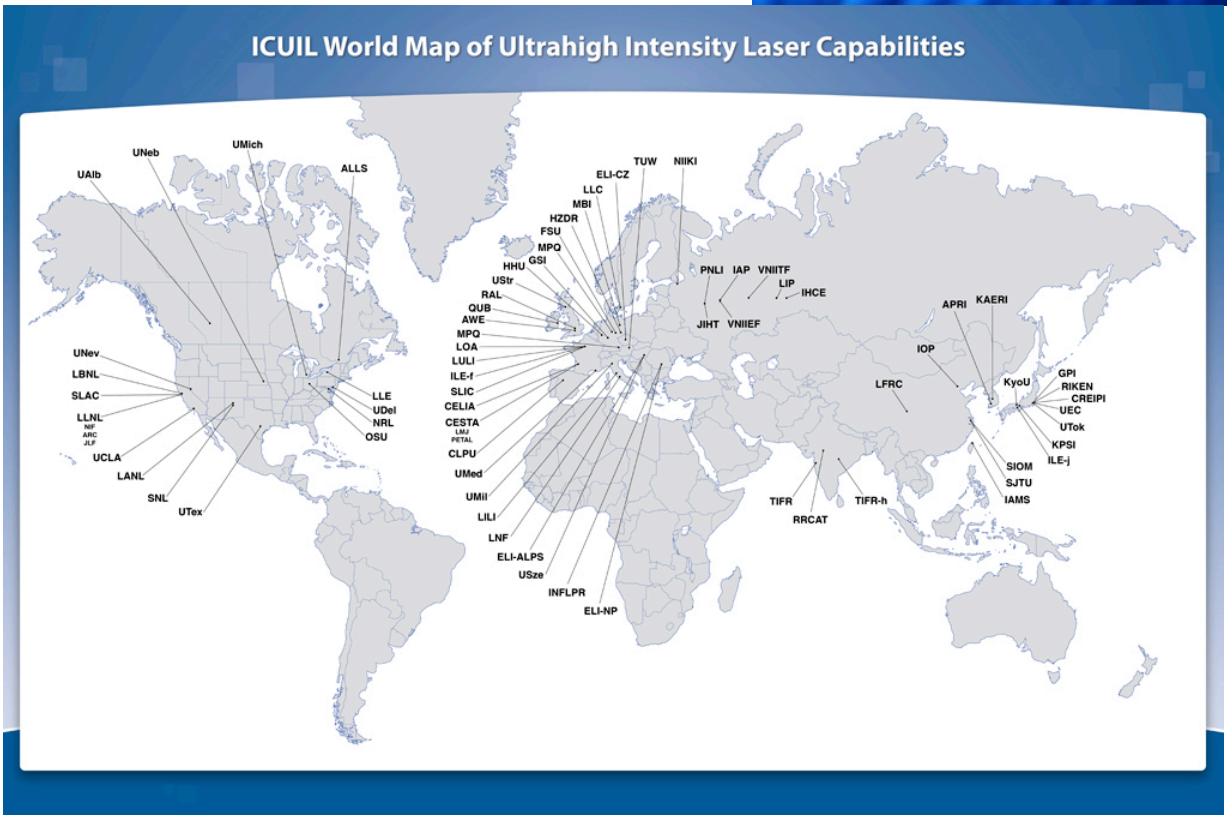
- Fund Raising

ICUIL has continued its corporate support program to afford maintenance of the ICUIL website, publish an annual newsletter, and support biennial conferences. The remaining funds are being targeted towards support of new outreach activities including student competitions held at the biennial conferences.

- ICUIL Biennial Conferences

The 6th biennial ICUIL conference was held September 12-17, 2014 in Goa, India and was hosted by the TIFR, with Ravi Kumar serving as the conference chairman. The INRS will host the 2016 ICUIL Conference at the Fairmont le Château Montebello, Canada which is situated on the shore of the Ottawa River. Tsuneyuki Ozaki and Dino Jaroszynski are serving as the conference chairmen who are organizing a full technical program that will focus on the generation, amplification, compression, and measurement of ultra-high-intensity lasers as well as a variety of novel scientific applications.

ICUIL
INTERNATIONAL COMMITTEE FOR ULTRA-HIGH INTENSITY LASERS



2014 ICUIL Membership

Toshiki Tajima	Chairman	International
Chris Barty	Co-Chairman	United States
Alexander Sergeev	Co-Chairman	Russia
Terry Kessler	Secretary	United States
Tsuneyuki Ozaki	Treasurer	Canada
Gerard Mourou		France
Hiroshi Azechi		Japan
John Collier		United Kingdom
Dino Jaroszynski		United Kingdom
Thomas Kuehl		Germany
Ravi Kumar		India
Christine Labaune		France
Wim Leemans		United States
Ruxin Li		China
Chang Hee Nam		Korea
Bedrich Rus		Czech Republic
Wolfgang Sandner		Germany
Heinrich Schwoerer		South Africa
Ken-ichi Ueda		Japan

Associate Members (without vote)

Ryosuke Kodama	Japan
Sandro de Silvestri	Italy
Nilson Dias Vieira Jr.	Brazil
Claes-Goran Wahlstrom	Sweden

ICUIL Related Science and Technology Highlights

I. Extreme Light Infrastructure (ELI)

ELI is a pioneer among the research infrastructures contained in the European ESFRI Roadmap in using EU structural funds for construction. One of the three ELI pillars is Nuclear Physics (ELI-NP), a European research center to study ultra-intense lasers interaction with matter and nuclear science using gamma and laser driven radiation beams. It will be located in Magurele, Romania. The total cost of the facility will be 300 million Euros and commissioning is expected to take place in 2018. The ELI-NP facility combines a high power laser system (HPLS) with two arms of 10 PW having intensities on the target in the range of 10^{23} W/cm^2. A gamma beam system (GBS) will deliver up to 19 MeV photons with extreme brilliance and bandwidth and is based on Compton scattering of a high repetition pulsed laser beam on a relativistic electron beam produced by a warm linac of 720 MeV. The GBS is being constructed by EuroGammaS, a European Consortium of academic and research institutions and industrial partners with expertise in the field of electron accelerators and laser technology from 8 European countries, the consortium led by INFN Italy. The scientific program for ELI–NP was elaborated by an international collaboration of more than 100 scientists from 30 countries. The ELI-NP team together with their collaborators from the international scientific community shaped the future scientific program of ELI-NP in a series of workshops and defined ten development directions for the facility. The latest workshop was convened in June. The Technical Design Reports were approved by ELI-NP International Scientific Advisory Board, chaired by Toshiki Tajima, and submitted in July, 2015.

II. International Center for Zetta-Exawatt Science and Technology (IZEST)

IZEST endeavors to unify a number of exawatt class facilities around the world. Almost 30 laboratories in 13 countries have signed a collaboration agreement. A new pillar within the IZEST organization, known as ZeptoScience, was formed. Preliminary theoretical models show the possibility to convert single-cycle femtosecond, near-infrared, ultra-relativistic intensity laser pulses to atto or zeptosecond, gamma ray pulses through the interaction with a thin, superdense plasma. This can be considered as an extension of the creation of XUV, attosecond pulses through sub-cycle processes at the femtosecond-scale within the strong-field processes of atomic, molecular and solid target plasmas. With increasing field strength, the subsequent gradients involved within a relativistic laser-plasma interaction create a small sub-cycle window for the photon up-conversion to reach gamma-ray energy scales. Efficient post-compressing these types of pulses using a thin film of thermoplastic to produce the spectral broadening to support a single-cycle pulse (~250 nm) followed by dispersion controlled chirped mirrors offers the possibility to produce the driving NIR pulses required to produce zeptosecond-scale x-ray pulses within a plasma. A ZeptoScience team is performing experiments to test the methods to efficiently compress existing laser technologies to the few-cycle, femtosecond regime with a sufficient intensity to pursue the creation of zeptosecond pulses. This work is being performed by a team based at Ecole Polytechnique (France), National Institute for Laser, Plasma and Radiation Physics (INFLPR, Romania), and ELI-NP (Romania). Theoretical studies are underway at the University of California Irvine to explore the potential properties and applications of such short gamma-ray pulses such as laser wakefield acceleration within solid-density plasmas

leading to crystal accelerations of TeV/cm, and vacuum QED studies leading to x-ray nonlinear responses through vacuum propagation.

III. The International School on Ultra-Intense Lasers

The School is organized by the International Committee on Ultra-Intense Lasers (ICUIL), Institute of Applied Physics of the Russian Academy of Sciences (IAP RAS), National Research Nuclear University MEPhI and Russian Federal Nuclear Center (RFNC-VNIIEF). This event is primarily aimed at providing postgraduate students and other early career researchers working in ultra-intense laser science with a thorough pedagogical grounding in high power laser physics, laser-matter interaction physics, laser-plasma accelerators, laser-based x-ray sources and inertial confinement fusion. The organizers believe that quite a wide scope of topics and the brilliant lecturers will attract more young researchers to this promising field of modern science. This is really one of the key goals and the intrinsic stimulus to hold the school. The school will be held will be held in the Hotel@Resort "Yunost" 40 km from Moscow, Russia, from 4 to 9 October, 2015.

IV. Laser Solutions to Orbital Space Debris

The first international workshop on the topic of Laser Solutions to Orbital Space Debris was organized by Ecole Polytechnique researchers including Dr. Mark N. Quinn and Prof. Gerard Mourou from the IZEST group; the workshop was by collaborators at the Astro Particle Cosmology (APC) Laboratory at the University of Diderot Paris. Over 30 million kg of debris including small fragments, rocket bodies and whole satellites have accumulated in Earth's orbit since the beginning of the space age. With large relative velocities in orbit surpassing10 km/s, even small cm size debris can impact and explode large multi-ton bodies creating many more additional fragments. Potentially, the very useful orbits containing the majority of communications satellites could be lost in a few decades unless strong mitigation and active remediation are introduced. This workshop brought together over 60 researchers from many different fields and nationalities, including Japan, Australia, Europe and the USA together with representatives from aerospace companies, including ESA, NASA and Airbus. It has become clear that these different pursuits can collaborate together and a key outcome of the workshop is the building of links in this worldwide community.

V. NIF EXAWATT

Chris Barty, an ICUIL Co-chairman, has presented his vision of the next generation of high intensity lasers at several conferences this year. With the implementation of chirped pulse amplification (CPA), it is possible for beam lines at the National Ignition Facility at the Lawrence Livermore National Laboratory, the Laser Mega-Joule (LMJ) facility in Bordeaux, France, the LFEX laser at the Institute for Laser Engineering in Osaka, Japan and the Omega EP facility at the Laboratory for Laser Energetics in Rochester, New York to create petawatt peak power laser pulses of nominally 1-ps duration and 1-kJ energy. New short pulse amplification architectures based on chirped "beams", novel pulse compressors and existing beam phasing technologies are capable of extracting the full, stored energy of a NIF or NIF-like beam line and in doing so produce from one beam line a near-diffraction-limited, laser pulse whose peak power would be in excess of 200 petawatts or 0.2 exawatts. This architecture is well suited to either low-f-number focusing or to multi-beam, dipole focusing concepts. With dipole focusing, it is anticipated that a single beam line of a NIF exawatt or so called Nexawatt system will be capable of reaching intensities in excess of

10^{26} W/cm^2 or more than 5 orders of magnitude beyond existing systems. The novel amplification architecture is based entirely on existing technologies, proven optical damage performance and straightforward extensions of existing manufacturing technologies.

VI. Highlights of High Intensity Laser Facilities

National Ignition Facility's ARC

The commissioning of the Advanced Radiographic Capability (ARC) laser system in the National Ignition Facility (NIF) is currently in progress. ARC is designed to ultimately provide eight beamlets with pulse duration adjustable from 1 to 50 ps, and energies up to 1.7 kJ per beamlet. The beamlets will be used to create x-ray point sources for dynamic, multi-frame high-energy x-ray radiographs of the imploded cores of ignition targets. They are critical for creating precision x-ray backlighters needed for NIF experiments studying complex hydrodynamics and material strength at extreme high energy density regimes. ARC can also produce MeV protons and electrons for future experiments in advanced fusion, TeV acceleration and proton radiography. Recently, a new front-end was installed to achieve higher pulse contrast, resulting in 80 dB for the preceding 200 ps. The ARC laser is integrated into the NIF laser system utilizing four of the NIF beams (1 quad) to produce 8 beamlets. The quad of beams can either be configured for NIF 3ω operation or for high-energy ps pulses, using hardware controlled during the automated shot cycle. Commissioning of 4 of the 8 beamlets is currently underway to operate at 1.2 KJ energy in 30 ps pulses to irradiate Au-wire backlighting targets.

Texas Petawatt

Center for High Energy Density Science researchers have completed a year-long project to improve the pulse contrast on the Texas Petawatt Laser. The new design started with two BBO-based OPCPA stages pumped by an optically synchronized pump laser. These stages amplify slightly chirped few ps pulses by six orders of magnitude and reduce the contrast pedestal width to a few ps. There are two LBO-based OPCPA stages that are pumped by 4 ns pulses. These have much less gain and the overall reduction in parametric fluorescence is about three orders of magnitude. All lenses in the glass amplifiers were replaced with off axis parabolic mirrors, eliminating all discrete prepulses. All problematic wave plates and thin transmissive optics in the laser were eliminated to prevent post pulses that would result in prepulses by nonlinear conversion. An Acousto-Optic Programmable Dispersive Filter was added to improve fourth order dispersion and steepen the rising edge of the compressed pulse. These enhancements resulted in a final contrast of nine orders of magnitude. This improvement enables the use of thin and reduced mass targets for ion acceleration and reduces pre-plasma effects for all experiments.

CEA's PETAL

Petawatt Aquitaine Laser (PETAL) will allow unique experiments in the field of ultrahigh intensity sciences, extreme plasma physics, astrophysics, radiography, and fast ignition by a combination of its own multipetawatt kilojoule beam and the nanosecond

multikilojoule beams of the Laser Mégajoule (LMJ). The PETAL facility is designed and constructed by the French Commissariat à l'énergie Atomique et aux énergies alternatives (CEA) to deliver energy up to 3 kJ in 500 fs at the wavelength of 1053 nm and is an additional short pulse beam to the Laser MegaJoule (LMJ) facility. PETAL has recently achieved 1.4 KJ at 2 ns with a 3.5 nm bandwidth to produce 1.15 PW with a 700 ps pulsewidth. The focal spot was measured to have 60% of its energy contained within a 20 μm and 80% within an 80 μm diameter. The goal is to reach 10^{20} W/cm^2 on target. The facility will be operated at a 1 kJ energy level for initial experiments due to the current damage threshold of the final optics.

SIOM's Petawatt Laser

Ruxin Li, an active member of ICUIL, reports significant progress from the State Key Laboratory of High Field Laser Physics at the Shanghai Institute of Optics and Fine Mechanics (SIOM) in China. In 2013 the output energy of the Ti:sapphire CPA laser system at SIOM reached 72.6 J at a pump energy of 140 J, corresponding to a peak power of 2.0 PW. At the end of 2014, a high gain chirped pulse amplifier based on a Ti:sapphire crystal 150 mm in diameter was demonstrated, with the highest output pulse energy of 192.3 J at the pump laser energy of312 J, corresponding to a pump-laser efficiency of 50.4%. The amplified chirped pulse had a bandwidth of 53 nm at 800 nm central wavelength. With the grating compressor efficiency of 72% and the 27.0 fs compressed pulse width obtained with part of the energy, this Ti:sapphire laser system could support a peak power of 5.13 PW. Meanwhile, a CPA/OPCPA hybrid laser system has achieved the peak power of 1.0 PW, where an LBO 100 mm in diameter was used in the final OPCPA, and the output energy of 45.3 J was obtained. A 10 PW level femtosecond laser system, combining this Ti:sapphire based CPA chain and this OPCPA booster amplifier, is currently being constructed.

LLE's OPAL Laser

The University of Rochester's Laboratory for Laser Energetics is developing plans to construct a 15 PW laser system that is pumped by its existing OMEGA EP facility, with a potential upgrade to 75 PW. Optical parametric chirped-pulse amplification (OPCPA) provides broadband gain for large-aperture beams by using Nd:glass lasers to pump deuterated potassium dihydrogen phosphate crystals. Scaling to kilojoule energies would enable focused intensities exceeding 10^{23} W/cm^2 with 20 fs pulses. A mid-scale optical parametric amplifier line (OPAL) pumped by the Multi-Terawatt laser (MTW) is being constructed to produce 7.5-J, 15-fs pulses and demonstrate technologies that are suitable for a kilojoule system pumped by OMEGA EP (EP-OPAL). In parallel, a novel Raman plasma amplifier is being developed; MTW is the picosecond pump laser and MTW-OPAL provides a tunable femtosecond seed. The ultra-broadband front end consists of a white-light continuum seed that is amplified by three noncollinear optical parametric amplifiers (NOPA's). The pulses are stretched to 1.5 ns before further amplification in NOPA4. The radial group delay of the lens-based image relays is compensated before the final DKDP amplifier, NOPA5, which is pumped by MTW using three switchyards to provide narrowband pump pulses at 526.5 nm. Completion of MTW-OPAL would lead to the final design and planning for an EP-OPAL laser system.

IUPAP WG.9 Annual General Meeting (AGM) held at the South-Eastern Universities Research Association (SURA) Headquarters, Washington, DC, June 5, 2015

Draft Minutes:

Present: Robert E. Tribble – Chair, Texas A&M, USA
Anthony W. Thomas – Past-Chair, U. of Adelaide, SA, Australia
Willem T.H. van Oers – Secretary, TRIUMF/U. of Manitoba, Canada
Jonathan Bagger – Director TRIUMF, Canada
Angela Bracco – Chair NuPECC, INFN-Milano, Italy
Umberto Dosselli – Director Laboratori Nazionali di Frascati, Italy
Hideto En'yo – Director RIKEN Nishina Center for Accelerator-Based Science, Japan
Donald F. Geesaman – Chair NSAC, ANL, USA
Dominique Guillemaud-Mueller – Deputy-Director IN2P3/CNRS, France
Thomas Glasmacher – Director FRIB, USA
Kobus Lawrie – Acting Director i'Themba Laboratories, Zuid-Afrika
Alinka Lepine-Szily – Co-Chair ALAFNA, U. de Sao Paulo, Brazil
Hugh Montgomery – Director Jefferson Laboratory, USA
Berndt Mueller – Associate-Director BNL, USA
Naohito Saito – Director J-PARC, Japan
Wenlong Zhan – Vice-President Chinese Academy of Sciences, China

Regrets: Dong-Pil Min – Chair ANPhA, Seoul National University, Korea
Guenther Rosner – Past-Chair NuPECC, FAIR, Germany
Susan Seestrom – Past-Chair NSAC, USA
Karlheinz Langanke – Director pro-tem GSI, Germany
Yanlin Ye – Past-Chair ANPhA, Beijing University, China

Absent: Victor A. Matveev – Director JINR, Dubna, Russia
Dinesh Srivastava – Director VECC, Kolkata, India

Members of IUPAP C12 present as observers:
Ani Aprahamian, Notre Dame University, USA
Mahananda Dasgupta, Australian National University, ACT, Australia
Claes Fahlander, Lund University, Sweden
Wei-Ping Liu, CIAE, China
Reiner Kruecken, TRIUMF, Canada
Eugenio Nappi, INFN-Bari, Italy
Hideyuki Sakai, Past-Chair C12, RIKEN, Japan
Joachim Stroth, Secretary C12, Goethe Universitaet Frankfurt, Germany
Hirokazu Tamura, Tohoku University, Japan

Guests: Elizabeth Boston, NSERC, Canada
Abhay Deshpande, SUNY at Stony Brook, USA
Jerry P. Draayer, President and CEO of SURA, USA
Richard Garrett, ANSTO, Australia
Janet Seed, STFC, UK

Words of Welcome by the Chair Robert E. Tribble

Adoption of the Agenda

Approval of the Minutes of the last AGM held at GSI, Darmstadt on July 11, 2014

Current Membership of IUPAP WG.9:

On behalf of the Executive of IUPAP WG.9, the Chair welcomed as new member:

- Thomas Glasmacher, Director of FRIB at MSU replacing C. Konrad Gelbke, Director of NSCL at MSU.
- Horst Stoecker resigned as Director of GSI; Karlheinz Langanke is the Director pro-tem of GSI.
- Naohito Saito has become the Director of J-PARC
- As of August 1, 2015, Umberto Dosselli will be replaced by Pierluigi Campana as Director of Laboratori Nazionali di Frascati.

Following the Annual General Meeting at SURA Headquarters letters of thanks for their serving on the IUPAP Working Group 9 were send to Umberto Dosselli, C. Konrad Gelbke, and Horst Stoecker by the Chair.

The Executive has also been informed about the serious illness of Guenther Rosner.

IUPAP Council and Committee Chairs (C & CC) Meetings:

The most recent one was held in Trieste, Italy, May 2015. In the past IUPAP WG.9 reported at the C & CC meetings. Since no information regarding the latest C & CC meeting was received no report was submitted. The Secretary will contact the IUPAP Secretariat in order to be informed about future C & CC meetings.

With regards to the latter your Executive was informed on September 11, 2015, that the next meeting of the C & CC will take place at the end of October; a report on the activities of IUPAP WG.9 will be submitted.

The IUPAP General Assembly took place in Singapore at Nanyang Technological University, November 5-7, 2014. The Chair presented the IUPAP WG.9 report that had been submitted.

IUPAP Report 41:

Various attempts have been made to further update nuclear physics laboratory descriptions in IUPAP Report 41 with very few replies received. It was decided that nuclear physics laboratories with no defined users organization will be removed from the report. To note IUPAP Report 41 can be found on the website:
(http://www.triumf.info/hosted/iupap/icnp/index.html)

Proposed Charges to Users Groups in Support of the Operation of Facilities:

The discussions were initiated by the statement of Beatrix Vierkorn-Rudolph, Deputy Director General of the Federal Ministry of Education and Research (BMBF), Germany, in charge of large scale research facilities, made at the previous IUPAP WG.9 AGM at GSI, July 11, 2014: FAIR should consider following the CERN model with regards to the costs of operations. The FAIR shareholder countries should pay 70% and the non-shareholder countries – 18% from the larger countries and 12% from the smaller countries of the latter – towards the costs of operations.
It was remarked that FAIR in addition to CERN is not the only facility that has initiated procedures to recover the operating costs, e.g. the European Spallation Source. However, it is to be noted that IUPAP has a definite policy for not charging the Users or Users Groups for the operation of large scale science research facilities; see:
http://iupap.org/wp-content/uploads/2013/12/
Recommendations22ndGeneralAssembly.pdf
In light of the ongoing changes in the management of FAIR/GSI this agenda item was tabled for discussion at a future meeting of IUPAP WG.9.

FAIR/GSI - the Review of FAIR by the Rolf-Dieter Heuer Committee:

Joachim Stroth commented on the present management of GSI/FAIR with Ursula Weyrich the CEO of GSI and Karlheinz Langanke the Scientific Director of GSI, pro-tem, until a joint Director of GSI and FAIR is appointed. The FAIR Council is due to meet this month (June). Georg Schuette, Staatssekretaer of the BMBF, is the Chair of the GSI Council since November 2014 and the German Government representative on the FAIR Council since December 2014; he has the responsibility within the German Federal Government for FAIR. He also initiated the Heuer review of FAIR and received its recommendations in February this year.
Reiner Kruecken, member of the Heuer review committee, commented on the recommendations presented to the Staatssekretaer Georg Schuette. The four scientific pillars for FAIR are: (1) Atomic, Plasma Physics, and Applications (APPA), (2) Compressed Baryonic Matter (CBM), (3) Nuclear Structure, Astrophysics and Reactions (NUSTAR), (4) antiProton ANnihilation, at Darmstadt (PANDA). The latter received the lowest ranking from the Heuer review committee. This has created a great deal of upheaval in the particle physics community (the PANDA Collaboration consists of 450 scientists from 17 countries and has been designing, building, and commissioning (parts of) the PANDA detector since 2004). IUPAP WG.9 has been approached to make known its position regarding the possible demise of the scientific research enterprise with PANDA. IUPAP WG.9 is NOT constituted as a scientific review committee. However, individual members may express their personal evaluation of the scientific merits of the

envisaged research program with PANDA. It is more appropriate for NuPECC, since PANDA is one of the strong positive recommendations in the last NuPECC Long Range Plan, to comment on the current situation. In fact a letter was sent (see attached FAIR_NuPECC_Letter_20150529.pdf).

NSAC and NuPECC Reports were incorporated in the presentations given during the Nuclear Science Symposium

Nuclear Science in South-America (Alinka Lepine-Szily)

Material: Slides

- ALAFNA is checking the possibility of becoming a group under CLAF
- Not a great deal of optimism about the future of the IF-SPU nuclear physics facility
- There are strong ties to the astronomy and astrophysics programs in Chile
- Would a concerted effort to discuss funding opportunities with government officials be of help?

Nuclear Science in Africa (Kobus Lawrie)

Material: Slides

- Most of nuclear science research is done in Zuid-Afrika
- A new low-energy tandem is being acquired
- A new facility for carbon dating is being setup on a 6 MeV tandem
- The i'Themba cyclotron facility is still working on getting a 'C70' for isotope production and ISOL rare-isotope production
- The funding for the preliminary study is in place but follow-up funding not yet procured

Report from ANPhA (Weiping Liu)

Material: Slides

- ANPhA was established some six years ago to strengthen the collaboration among Asian nuclear scientists and to constitute a platform for discussing future nuclear science facilities and large scale instrumentation in Asia
- It is expending its membership to include more Asian countries
- The report summarized the various accelerator based nuclear physics projects under construction (RIB in China, RAON in Korea, JUNA in China); the deep underground laboratories under construction in Australia, China, Korea, and Taiwan for dark matter searches and neutrino-less double beta-decay); accelerator driven sub-critical systems in China and Japan

Nuclear Physics for Medicine (Anthony W. Thomas)

The next International Nuclear Physics Conference, which will be held in Adelaide, SA, Australia, September 11 – 16, 2016 will include specific parallel sessions devoted to "Nuclear Physics and Medicine" and there will be a public lecture on this topic during the

conference. See also the recently published NuPECC Report "Nuclear Physics for Medicine" at the website: http://www.nupecc.org .

Nuclear Science Symposium:

The 2015 Nuclear Science Symposium was held at SURA Headquarters in Washington, D.C. on June 4, 2015.
Based on experiences gained from the previous Nuclear Science Symposium at LNF di Frascati in 2013 it was concluded that a better approach would be to have direct input from the Funding Agency representatives in the organization of future Nuclear Science Symposia.
In discussions with Timothy J. Hallman, Associate Director of Science for Nuclear Physics at the DoE, a two year cycle of the Nuclear Science Symposia (instead of a triennial timeframe) was adopted and the scientific program of the Symposium formulated. The Symposium presented an overview of current forefront nuclear science research being addressed or intended to be addressed together with the upgrading of current facilities and planned large new facilities in the three global areas – Asia, Europe, and the Americas. In addition there were three presentations on: 'Neutrino Masses, Neutrino Mixing, Neutrino-less Double Beta-decay and the Deep Underground Science Laboratories (with emphasis on neutrino-less double beta-decay)', 'The Science Case for an Electron-Ion Collider', and 'The Science Programs of Rare-Isotope Beam Facilities' ; (see the website:
http://www.triumf.info/hosted/iupap/icnp/index.html under 'Meetings'
The Symposium concluded with an 'in camera' meeting of the government/funding agency representatives with as Chair Timothy J. Hallman, Associate Director for Nuclear Science at the DoE Office of Science, to discuss their individual perspectives. Those present in addition to the Chair were:

- Elisabeth Boston – Natural Sciences Research Council of Canada [NSERC]
- Richard Garrett – Australian National Nuclear Research and Development Organisation [ANSTO]
- Dominique Guillemaud-Mueller – Centre National de la Recherche Scientifique of France IN2P3/CNRS]
- Eugenio Nappi – Istituto Nazionale di Fisica Nucleare of Italy [INFN]
- Janet Seed – Science and Technology Facilities Council of the UK
- Wenlong Zhan – Chinese Academy of Sciences [IMP-CAS]

This it is hoped will lead to increasing mutual awareness of these agencies and eventually to cooperation in funding the future large scale nuclear science facilities.

Further information regarding the last item will be forthcoming shortly through reporting by Timothy Hallman, Associate Director for Nuclear Physics in the Office of Science at DoE.

Other initiatives by IUPAP WG.9:

A possible report from the Workshop "Nuclear Physics for Medicine" from next year's INPC.
The IUPAP WG.9 executive was asked to comment on the closing on March 9, 2015, of the Meier-Leibnitz Laboratory, with its Tandem Accelerator for accelerator mass

spectroscopy and nuclear structure physics with the Q3D spectrometer (unsurpassed resolution), for environmental, and health and safety reasons. This is foremost an issue for the German physics community and for NuPECC. Since then the partners in the operation of the facility (Universitaet Muenchen and Technische Universitaet Muenchen) have been able to arrange for its continued operation.

The formation of an interim IUPAP Working Group on Accelerator Physics:

The formation of a IUPAP Commission on Accelerator Physics has been discussed for the first time at the International Particle Accelerator Conference, which was held in Kyoto, Japan, in 2010, at which time it was joined by the European Particle Accelerator Conference series. More recently Roy Rubinstein, secretary of ICFA, send a missive to the President of IUPAP asking for the establishment of such a Commission, one of the main arguments being that accelerator physics covers a very wide area from particle physics to nuclear physics to material sciences to nuclear medicine to industrial facilities and many of the accelerator physicists are not presented by any of the existing IUPAP Commissions. The IUPAP Secretariat in turn has asked various stake holders for nominations to form an interim Working Group. IUPAP C12 and IUPAP WG.9 will provide a combined set of nominations within the deadline set by IUPAP.
A slate of nominees has been send to IUPAP's Executive by both IUPAP WG.9 and IUPAP C12.

.

Date of the next IUPAP WG.9 meeting:

At the INPC 2016, September 11-16, in Adelaide, SA, Australia. Concerns were expressed about the long travel time required to the AGM of IUPAP WG.9 in 2016 for a one and a half day meeting. Possibly video-conferencing needs to be arranged.

The IUPAP WG.9 Nuclear Science Symposium ended with a working dinner.

Thanks are expressed to Jerry P. Draayer, President and CEO of SURA, and the staff of SURA for the kind hospitality provided during both the Symposium and the AGM.

TRIUMF, Vancouver, BC, June 30, 2015

Willem T.H. van Oers, Secretary of IUPAP WG.9

WORKING GROUP 10

Activities of the Astroparticle Physics International Committee (IUPAP WG 10)

September 2014 – September 2015

Michel Spiro (Chair of ApPIC)

After our plenary meeting on May 2014 on High Energy Multi-messenger Astronomy and on Data Policy in Astroparticle Physics, starting with High Energy Messenger Astronomy, I reported to APIF (The Astroparticle Physics Interanational Forum of concerned Funding Agencies) the outcome of our meeting, which can be found in the 2013-2014 IUPAP WG 10 report.

We agreed with the Funding agencies that ApPIC should report to the community on these main conclusions, before coming back to the Funding Agencies.

This was done on three main occasions:

- An ApPIC IUPAP WG10 report to the 2nd International meeting for large neutrino infrastructure (meeting jointly organized by ICFA neutrino panel IUPAP WG1 and ApPIC IUPAP WG 10) on April 21, 2015
- An ApPIC IUPAP WG10 report to the International Cosmic Ray Conference in Den Haag, IUPAP C4 on July 31, 2015
- An ApPIC IUPAP WG 10 report to the TAUP 2015 IUPAP sponsored conference on Astroparticle physics, on September 7, 2015

After some iteration, the messages on Data Policy in Astroparticle Physics, especially for High Energy Multi Messenger Astronomy is the following:

5 tempos:

- A period of Data Validation by the collaboration (typically one or two years maximum) is most often needed. It can be used to define a priori the analysis criteria for certain searched (so called blind analysis)
- First data releases could be for joint analysis by collaborations: for combinations and mutual cross-check, for complementary approaches,
- Open alerts (for collaborations on multi-messenger astronomy) are also the first step,
- The next step is Data in open access for the concerned community (this needs the community to be prepared with virtual observatories, help-desk for data and codes to avoid false discoveries)
- Data preservation and legacy should also be considered from the beginning.

Few remarks:

- Give proper credit by quoting the used data release (collaborations)

- There is always competition (e.g. for funding opportunities, fame, …) but there must be also consensus on sharing of data, know-how,…
- Memorandum of Understanding (bottom-up initiated and science driven) should be signed at the very beginning by the Funding Agencies, with attached resources on these issues of open data policy

ApPIC should now hopefully report soon to APIF on these conclusions and will enlarge its discussion to other field of Astroparticle Physics, starting first with its interplay with obsevational cosmology. The goal, at the end would be to produce a position paper on data policy, exchange of codes and know-how in the field of Astroparticle Physics , taking into account recommendations and practices in America, Europe and Asia.

Appendix: **MEMBERSHIP**

Chair: Michel Spiro, France
Secretary: Pierre Binetruy, France
Roger Blandford, USA
Zhen Cao, China
Eugenio Coccia, Italy
Don Geesaman, USA
Kunio Inoue, Japan
Naba Mondal, India
Angela Olinto, USA
Natalie Roe, USA
Sheila Rowan, GB
Valery Rubakov, Russia
Bernard Sadoulet,USA
Subir Sarkar, GB/Denmark
Christian Spiering, Germany
Yoichiro Suzuki, Japan

Karl-Heinz Kampert, Germany, ex-officio as C4 Chair

Ani Aprahamian, USA, Associate member (C12)

Gravitational Wave International Committee (WG.11) report to IUPAP

2 October 2015

(prepared by Stan Whitcomb, *Caltech* [Secretary] and
Sheila Rowan, *U. of Glasgow* [Chair])

The Gravitational Wave International Committee (GWIC) was formed in 1997 to facilitate international collaboration and cooperation in the construction, operation and use of the major gravitational wave detection facilities world-wide. From 1999 until 2011, GWIC was recognized as a subpanel of PaNAGIC (IUPAP WG.4). In 2011, GWIC was accepted by IUPAP as a separate Working Group (WG.11).

GWIC meets annually adjacent to an appropriate conference. In June 2015, GWIC met in Gwangju, Korea, in conjunction with the eleventh Edoardo Amaldi Conference on Gravitational Waves. Other recent meetings have been held in Banff(2014), Warsaw (2013), Rome (2012), Cardiff (2011), Hannover (2010), Pasadena (2009), and New York City (2009). Other business during the year is conducted via email or other electronic communication.

GWIC maintains a website at https://gwic.ligo.org/ which contains an up-to-date listing of members, its by-laws, announcements of its activities, and links to other items of interest to the gravitational wave community.

GWIC Membership

The membership of GWIC represents all of the world's active gravitational wave projects, as well as other relevant communities, covering gravitational wave frequencies from nanohertz to kilohertz. Each project has either one or two members on GWIC depending on size. GWIC also includes representatives from ISGRG (IUPAP AC2) and from the astrophysics/theoretical relativity community. Two members of GWIC (Eugenio Coccia and Sheila Rowan) are also members of ApPIC (WG.10), ensuring close communications.

The GWIC Chair is elected by its membership at its annual meeting in odd years. In 2015, GWIC chose Sheila Rowan as its Chair, serving until 2017. The GWIC Chair appoints the Executive Secretary, and Sheila continued Stan Whitcomb in this position for one year.

Each member project in GWIC determines its representatives on GWIC. In this year, two member projects appointed new representatives: ACIGA (Bram Slagmolen) and NANOGrav (Xavier Siemens). In addition, GWIC invited the President of the International Astronomical Union (IAU) Commission on Gravitational Wave Astrophysics (Neil Gehrels) to join (see below).

GWIC Activities in 2014-2015

GWIC convenes the biennial Edoardo Amaldi Conference on Gravitational Waves, sponsored by IUPAP as a "class B" Conference. The Amaldi meeting is considered by many in the gravitational wave community to be their most important international gathering. The members of GWIC serve as the Scientific Organizing Committee for the Amaldi meetings. The 2015 Amaldi meeting was held at Gwangju (Korea) in June 2015. This was the first time that the Amaldi meeting was held in Korea, and only the second time in Asia. The meeting was a very successful one, in spite of some concerns about MERS in the time just before the meeting.

A major decision at the 2015 GWIC meeting was the selection of a venue and local organizing group for the 2017 Amaldi meeting. Four groups presented proposals to host the 2015 Amaldi meeting, in CERN (Switzerland), Budapest (Hungary), Gwangju (Korea), and Minneapolis (USA), and Pasadena (USA. All proposals were judged to be excellent. Pasadena was selected, hosted by a local organizing committee led by the LIGO Laboratory.

Since 2006, GWIC has awarded an annual international prize for an outstanding Ph. D. thesis based on research in gravitational waves. Since 2013, GWIC has coordinated its prize with the Stefano Braccini Thesis Prize, (sponsored by the Friends of Stefano Braccini). GWIC manages the solicitation of nominations and selection of the two winners. The two prizes are distinguished by emphasizing the impact to the field for the GWIC Thesis prize and by emphasizing creativity and innovation for the Stefano Braccini Prize. There were 15 theses nominated this year, from four different countries.

The 2014 GWIC Thesis Prize was awarded to Leo Singer from Caltech, and the 2014 Stefano Braccini Prize was awarded to Yan Wang from the University of Hannover. Springer agreed to extend its agreement with GWIC to accept nominations from GWIC of both prize winners for publication in the Springer Thesis Series.

At its 2014 meeting in Banff, GWIC heard about plans for a reorganization of the IAU (the analogous international body to IUPAP in the area of astronomy and astrophysics), with a call for new Commissions (similar in some ways to Working Groups in IUPAP). GWIC concluded that a Commission in gravitational wave astrophysics would benefit the gravitational wave community broadly and that GWIC should encourage appropriate members of the gravitational wave community if they decided to prepare a proposal.

At this meeting, GWIC learned that such a proposal had been submitted and accepted (http://www.iau.org/science/scientific_bodies/commissions/D1/). The new Commission will focus on the astronomical aspects of gravitational wave observations, and thus will have a complementary but related role in the international scientific community. Indeed, a number of members of GWIC are also members of the IAU and have already joined this new Commission. However, to ensure coordination between the two bodies, GWIC

decided to invite the President of the new Commission (Neil Gehrels) to join GWIC, and he has accepted.

The impending initial operation of Advanced LIGO and Advanced Virgo has turned substantial attention in the ground-based interferometer community to the longer term future, with initial discussions concerning possible future facilities. There is considerable sentiment within GWIC that such discussions should include international collaboration and planning. GWIC decided to charge a small group of members to discuss how to aid this effort, including considerations of whether a GWIC subcommittee focused on this area should be formed. This group considering this will be charged to bring a recommendation on formation of a subcommittee back to GWIC at our next meeting.

Membership of GWIC (as of October 2015)

Chair: Sheila Rowan
ACIGA: Bram Slagmolen
AURIGA: Massimo Cerdonio
Einstein Telescope: Michele Punturo
European Pulsar Timing Array (EPTA): Michael Kramer
GEO 600: Karsten Danzmann, Sheila Rowan
IndIGO: Bala Iyer
KAGRA: Takaaki Kajita, Yoshio Saito
LIGO, including the LSC: Gabriela Gonzalez, David Reitze
LISA: Neil Cornish, Bernard Schutz, Robin Stebbins, Stefano Vitale
NANOGrav: Xavier Siemens
NAUTILUS: Eugenio Coccia
Parkes Pulsar Timing Array (PPTA): George Hobbs
Spherical Acoustic Detectors: Odylio D. Aguiar
VIRGO: Fulvio Ricci, Jean-Yves Vinet
Theory Community: Clifford Will
AC2 Representative: Beverly Berger
IAU Commission D1 Representative: Neil Gehrels
Executive Secretary: Stan Whitcomb

Report from WG 12, October, 2015

Mandate
At the working group's meeting in Tokyo in July 2013, the following mandate was approved

- The working group (WG 12) shall review current energy issues and through International Union of Pure and Applied Physics (IUPAP) make briefs available for the global physics community and policy makers as well as the public at large.
- The group meets once or twice a year to review selected topics taking advantage of local experts where the meeting is held.
- The topics considered should include energy supply, carriers, storage and use. Both advanced and low tech systems shall be looked into.

It was agreed to make briefs on selected issues rather than technical reports.

Publications

Drafts for some 15 briefs have been received or are in the process of being prepared for publication. These include solar energy, wind energy, hydro power, ocean wave energy, ocean tidal energy, geothermal energy, nuclear power, fusion, coal, gas hydrates, biogas, biofuel, bioenergy (solid), energy storage, batteries. Included is a survey paper on the various energy resource estimates.

At the meeting in Oslo, the drafts were discussed and it was agreed to publish them in a series of EnergyPages similar to the Canadian SciencePages (http://sciencepages.ca/publications/). Each document will have an ISBN and the key authors will be named on behalf of the group. The typical length of a brief will be 6 pages that can be printed in paper format.

The briefs are planned to be published in batches of four. The first four briefs in preparation are hydro power, nuclear energy, coal and biofuels. The target date is April 2016. Before publication, the briefs will be peer reviewed. Hopefully, a science writer can be engaged in the final editing of the briefs if funding can be secured. The next batch will cover several topics within bioenergy like biogas, woody biomass, liquid biofuels, etc.

Several members of the group have been involved in the SCOPE Bioenergy assessment. It is published as volume 72 in the SCOPE report series and is available for free download at

http://bioenfapesp.org/scopebioenergy/index.php

The group plans to meet in Sao Paulo early next year. Funding for the workshop is currently being sought by the local organizer. The funding proposal will also include publication costs for 4 of the energy briefs. During 2015, the Bioenergy report has been launched at FAPESP in Sao Paulo, EU's energy week in Brussels, and World Bank in Washington DC.