**Report on 2012 activity by AC.2**

2011-12 was a relatively quiet year for the Commission itself apart from the AC2-sponsored Marcel Grossmann meeting MG13, which is reported elsewhere on the Agenda, but there is a major deveopment to report in the founding of LIGO India.

AC.2 is preparing for its next triennial GR meeting, GR20, which will be on 8-13 July 2012 in Warsaw; IUPAP sponsorship is sought. Following the precedent of GR18 and Amaldi 7 in Sydney in 2007, the meeting will be collocated with Amaldi 10, with some joint sessions. (IUPAP, via AC2, have also been sponsors of the biennial Amaldi series, which is organized by GWIC, now Working Group 11 of IUPAP.)

The GR20 Scientific Committee has already fixed the plenary talks and workshop chairs, doing their best in the process to achieve geographical and gender balance: a couple of slots are left open for hot topics that arise in the coming year. The Local Committee is well advanced with local arrangements and has established its web site at http://gr20-amaldi10.edu.pl/. The meeting will as usual include a General Assembly of AC.2 in its guise as the International Society on General Relativity and Gravitation, and elections of new officers of AC.2, as well as award ceremonies for AC.2's thesis prizes and Fellowships, for which we are currently seeking nominations. Because of the withdrawal of the sponsors of the Xanthopoulos Prize, AC.2 will, if IUPAP agrees, replace it with a Young Scientist Prize.

The Society's journal has seen a rise in quality and quantity of publications, and further improved its impact factor. New Editors-in-Chief have been appointed, namely Abhay Ashtekar, former AC.2 President, and Roy Maartens, and have instituted new letter and review formats as well as an "Editor's choice" marking for high-quality papers. Other features, like the thriving "Golden Oldies", will continue: a book containing a selection of the least obtainable or well known Oldies is in press with Springer Verlag.

2015 will make the 100th anniversary of Einstein's discovery of general relativity. AC2 will mark this occasion with a centenary volume to be published by Cambridge University Press, containing 12 chapters written by 31 international leaders in the field, and edited by the Commission's officers and another member. The scope of the gravitational science has widened considerably in recent years. The Commission expects that the volume will be read not only by specialists in general relativity but also by researchers in several related areas, especially cosmology, astrophysics, computational science, high energy physics, quantum field theory and geometric analysis. We envisage the volume being a landmark that will be visited by researchers in these diverse disciplines for decades.

Perhaps the most important scientific initiative involving major international collaborations in the area covered by AC2 is the LIGO-India project and we accordingly report it at some length.

Currently, there are two Laser Interferometric Gravitational Observatories (LIGO) in the US, one in Hanford, WA, and the other in Livingston, LA. They collaborate closely with the European observatory VIRGO near Pisa, Italy (and also a smaller observatory, GEO, in Hanover, Germany). However, these locations are all roughly at the same latitude and it has been widely recognized that placing another interferometric observatory at a widely separated southern latitude would significantly improve the science reach of the network. In particular, it would enable one to localize the sources in the sky with a much greater accuracy, thereby making the all-important optical follow-ups of events feasible. The two LIGO observatories have three detectors between them, one at Livingston and two at Hanford. All three have just been upgraded to the 'Advanced LIGO' sensitivity level, which is high enough to expect definitive reception of gravitational waves when they go on line. Scientifically, there is now a strong case for placing one of the two Hanford detectors in a gravitational wave observatory at a suitable site in India.

Therefore the LIGO team in the US and the IndIGO consortium of Indian gravitational wave scientists began a dialogue in January 2011. The process since then has been elaborate but surprisingly speedy. On the US side, it involved repeated visits by several leaders of the LIGO team to India to evaluate pros and cons; detailed evaluation by the LIGO Caltech-MIT Oversight Committee; three meetings of a National Science Foundation (NSF) Review Panel; and meetings between the NSF

Assistant Director of the Mathematics and Physical Sciences Division, the Chair of the Indian Atomic Energy Commission (AEC) and the Secretary of the Indian Department of Science and Technology (DST). On the Indian side, the process involved bringing together three key leading institutions, the Inter University Center for Astronomy and Astrophysics (IUCAA), the Raja Ramanna Center for Advanced technology (RR-CAT), the Institute for Plasma Research (IPR), and a dozen other research centers; making a successful case to DAE and DST; and convincing the Planning Commission of India that LIGO India should be included among the 'mega- projects' to be funded in the Five Year Plan that begins in 2012. IPR will take charge of the vacuum systems, RR-CAT will look after optics, and IUCAA will look after site selection and data analysis, and also build the LIGO-India Science Collaboration, bringing together the user community.

Although the time-window was narrow, because there was much excitement in the resulting gains in science and technology on both sides the Planning Commission has included LIGO India for funding at a level of approximately $130M over the next five years with follow up funding of approximately $50M in the subsequent 5 years. This development is significant because India has a 100% track record of funding mega-projects once they were in the five year plan, even in cases when there were significant cost over-runs. The entire 5 year plan has now been sent to the cabinet for its approval.

On the US side, the NSF Panel unanimously recommended that the science case for LIGO India is so strong, and the LIGO lab has done sufficient groundwork, to go ahead. Thanks to these recommendations, the National Science Board of the United States authorized NSF in the summer of 2012 to take actions it deems appropriate for the success of this initiative.

With this highest level clearance from the US, efforts are now under way so that the LIGO-India observatory can start taking data in 2019-20. In areas covered by Commission AC2, this initiative will take international collaborations to a new level. The US will donate an advanced LIGO detector valued at approximately $60-70M, while India will invest approximately $180M to build a facility available for the entire LIGO scientific community. Caltech, MIT and the Albert Einstein Institute in Germany will already start training young Indian scientists this calendar year, especially in experimental areas. A new data analysis centre at IUCAA will be created to enhance the current capabilities and will serve the entire LIGO-VIRGO community. The project brings tremendous new opportunities for international science.

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