Report of Affiliated Commission 2 to the IUPAP 2008 General Assembly

The commission's major tri-annual conference, GR18, was held at Sydney in July 2007, jointly with Amaldi 7, organized through GWIC which the Commission also sponsors within IUPAP. It worked well in promoting dialogues and cross-fertilizations of ideas between different areas of our diverse field. The standard of plenary talks was notably high, the facilities at the venue very good and the setting pleasant. There were three public lectures which attracted large audiences. Attendance was not as high as that at past conferences in Europe or North America in large part because of travel costs. We expect to see a significant growth in the number of participants at GR19 which is scheduled to take place in Mexico City in July 2010.

During the GR18 meeting a new President, Abhay Ashtekar (Penn State), was elected. The new GWIC chair, James Hough (Glasgow), is a GRG Society member, and another member, Eugenio Coccia (Rome), has agreed to act as the liaison between AC2, GWIC and PANAGIC. Several international prizes were awarded. The Xanthopoulos Prize, the most prestigious prize in the field for younger researchers, was awarded jointly to Thomas Thiemann and Martin Bojowald. Selection criteria for this award now incorporate the wording used for the IUPAP Young Scientist Prizes to ensure that candidates with non-standard careers are not excluded because they do not meet the age criterion. The GWIC thesis prize was awarded to Yoichi Aso. The Hartle Awards for student presentations at GR18 went to 9 students from Australia, Europe, New Zealand and the US.

AC2 also acts as sponsor, within IUPAP, for the Marcel Grossmann series. MG11 was held in Berlin in 2006, and MG12 will be in Paris in 2009. There were about 750 participants at MG11. Marcel Grossmann awards were made to Roy Kerr (New Zealand), discoverer of the famous Kerr solution for a rotating black hole and George Coyne, former Vatican Observatory director.

Our journal, *General Relativity and Gravitation,* was revitalized in 2005-6 with a new Editorial Board (and new publishers, Springer). Under the joint leadership of Professors George Ellis and Hermann Nicolai, it has made a significant leap in the last two years. AC2 proposed several new initiatives to enhance the number of topical reviews and special issues dedicated, for example, to proceedings of focused workshops. The journal continues to publish the usual papers, comments and book reviews, and its more unusual "Golden Oldies" series reprinting classic papers which are not otherwise readily available.

In its role as the GRG Society, AC2 has undergone impressive growth in membership. It intends over the next three years to strengthen its ties with the National Societies in our field. Regular mailings sent out by the Secretary, Malcolm MacCallum (QMUL, London), through AC2's open access 'Hyperspace' service already keep the international community aware of various events and opportunities in our field, and we hope to extend and improve this service. The Society's own website, grg.maths.qmul.ac.uk/grgsoc/, has been considerably augmented and has undergone a major reorganization, and we plan to continue this process with improved design in the coming year.

Among the items now available to members via the Society's website are the Bulletins issued between 1962 and 1970 by the present AC2 organization's predecessor. These were scanned by the Niels Bohr library of the AIP which possesses a copy. The Society itself has

established an archive at the Max Planck Institute in Golm and material has been donated by the current and former secretaries and others.

After some discussion among Committee/Commission members we have decided to found thesis prizes of our own to complement the GWIC thesis prize. We have secured external sponsorship for one award and are very optimistic about obtaining additional sponsorships. These prizes will be awarded for the first time in 2010, at our tri-annual conference GR19, to be held in Mexico City.

Another development is a proposal to initiate *Fellowships of the GRG Society*. This will require a constitutional change but to avoid delay it is intended to call an Extraordinary General Meeting rather than wait until 2010.

Moving from organization to Science, we note that the discipline under this Commission now encompass very diverse areas, including geometric analysis, computational relativity, gravitational wave physics and associated instrumentation and data analysis, relativistic astrophysics, physical cosmology, early universe studies, quantum cosmology, quantum geometry, quantum gravity and string theory. It is even more impressive that significant advances continue to occur on all these diverse frontiers. In particular, the earth based gravitational wave detector LIGO has achieved the planned sensitivity along the entire range of its frequency band. Stable binary black hole simulations are now feasible and capable of providing interesting astrophysical insights as well as necessary templates for data analysis. Global existence theorems for small initial data have emerged in full non-linear general relativity. The mathematical status of quantum field theory in curved space-times has been elevated to that of quantum field theory in flat space-time. Detailed analyses have emerged indicating how non-perturbative features of quantum gravity can lead to the resolution of the big-bang singularity and of the information loss quandary. Consequently, there is a great deal of enthusiasm and the field attracts highest quality young researchers.

Overall we believe the subject and AC2 are both in excellent health.