PREFACE

In 1975 the Marcel Grossmann Meetings were established by Remo Ruffini and Abdus Salam in order to provide a forum to meet every three years to discuss recent advances in gravitation, general relativity and relativistic field theories, emphasizing their mathematical foundations, physical predictions and experimental tests. These meetings aim to facilitate the exchange of ideas among scientists to deepen our understanding of space-time structures and to review the status of ongoing experiments and observations testing Einstein's theory of gravitation either from the ground or space.

The Marcel Grossmann Meetings have since grown under the guidance of an International Organizing Committee and a large International Coordinating Committee. The first two meetings MG1 and MG2 were held in Trieste (1975, 1979). A most memorable MG3 (1982) was held in Shanghai and was the first truly international scientific meeting that took place in China after the so-called cultural revolution. MG4 was held in Rome (1985). The topics presented at these meetings have gradually broadened in order to focus on issues of major scientific interest. It was in this way at MG4 that the birth of "astroparticle physics" was testified to in the inaugural lecture of Abdus Salam and by entire sessions dedicated to this new topic. These first four meetings were published by North Holland in Amsterdam.

Starting with MG5 held in Perth (1988), the proceedings have been published by World Scientific in Singapore. General relativistic theories have become more and more the theoretical foundation for a very broad new field of research encompassing experiments and observations which make use of techniques from space missions in the optical, X- and gamma-ray wavelengths as well as large radio and optical ground-based observatories all the way to underground laboratories. The enormous momentum gained following very large investments in observational techniques, unprecedented in other areas of science, has gradually led to the maturing of a new field of research: relativistic astrophysics. Paradoxically Einstein's theory born as a purely theoretical and mathematical conceptual revolution with extremely feeble supporting experimental evidence has become the driving force in the theoretical understanding of possibly the largest observational and experimental scientific effort in the history of mankind. The Marcel Grossmann meetings have followed these developments at MG6 (Kyoto, 1991), MG7 (Stanford, 1994) and MG8 (Jerusalem, 1997), becoming an important point of reference for this field.

MG9, or 'MG IX MM' to emphasize the millennium change, was organized by its International Organizing Committee composed of D.Blair, Y.Choquet-Bruhat, D.Christodoulou, T.Damour, J.Ehlers, F.Everitt, Fang Li Zhi, S.Hawking, Y.Ne'eman, R.Ruffini (chair), H.Sato, R.Sunyaev, and S.Weinberg. Essential to its planning was an International Coordinating Committee of 135 members from scientific institutions of 54 countries. In terms of the number of participants MGIXMM was the largest of the Marcel Grossmann Meetings, attended by 997 scientists of 69 nationalities.

Its opening was held on July 2, 2000 in the Aula Magna hall of the University of Rome "La Sapienza", one of the largest universities of Europe, where Tullio Levi Civita and Enrico Fermi were members of the Faculty of Science. Official addresses

included one by the President of the University. From then until July 8, the campus of the University designed in 1936 by a team of architects led by Marcello Piacentini, was the arena for the intense work of the meeting. The morning sessions included 34 plenary talks,while the parallel sessions, 88 in total, were held in the afternoons, both having review talks and original contributions.

Following tradition the Marcel Grossmann Award ceremonies were held during the meeting, this time taking place in the "Sala della Protomoteca" of the Campidoglio, the city hall of Rome. Individual awards were presented to Cecille and Bryce DeWitt, Riccardo Giacconi and Roger Penrose, while the Institutional Award went to the Solvay Institute, accepted on behalf of the Institute by Jacques Solvay and Ilya Prigogine. The award is given in the form of a silver replica of the sculpture TEST (Traction of Events in Space and Time) created by the Italian sculptor Attilio Pierelli.

The social program included tours around Rome, and the banquets were held in two beautiful palaces of old Rome, Palazzo Colonna (hosted by Prince Colonna) and Palazzo Lancellotti, in order to accommodate so many participants.

The meeting ended on July 8, 2000 at the closing ceremony in the Aula Magna.

Remo Ruffini thanked the members of the Organizing and Coordinating Committees for their continuing efforts and the Italian Ministery of Foreign Affairs, EC, IUPAP, UNESCO, ICTP for financial support which led to the success of a forum on such a scale.

The three volumes of the proceedings of MGIXMM present a rather authoritative view of relativistic astrophysics which is now becoming one of the priorities in the scientific endeavour. The first volume includes the plenary talks and parallel session review talks, while the last two volumes include the remaining contributions to the parallel sessions. The acceptance speeches for the Marcel Grossmann Awards are also included in these proceedings.

The papers that appear in these three volumes cover all aspects of gravitation, from mathematical issues to recent observations and experiments, summarizing a complete picture of our current understanding of gravitational theories at the turn of the millennium.