Frascati Workshop 2009

Silver Jubilee

The Eight International Workshop on

Multifrequency Behaviour of High Energy Cosmic Sources

Vulcano, Sicily, Italy May 25-30, 2009

Edited by
Franco Giovannelli and **Lola Sabau-Graziati**

Frascati Workshop 2009

Silver Jubilee

Multifrequency Behaviour of High Energy Cosmic Sources

Vulcano, Sicily, Italy May 25-30, 2009

Organizing Institutions

Istituto di Astrofisica Spaziale e Fisica Cosmica, IASF-Roma, INAF, Roma, Italy
Dpt. de Programas Espaciales y Ciencias del Espacio, DPECE-INTA Madrid, Spain
E.O. Hulburt Center for Space Research, HCA-NRL, Washington D.C., USA
Max-Planck Institut fr Extraterrestrische Physik, MPE, Garching, Germany
St. John's College, SJC, Annapolis MD, USA
Institute für Astronomie und Astrophysik, Karls Eberhard, Universität SAND 1, Tübingen, Germany

Scientific Organizing Committee

James Howarth Beall, HCA-NRL & SJC
Franco Giovannelli, IASF-Roma, INAF (Chairperson)
Gottfried Kanbach, MPE
Lola Sabau-Graziati, DPECE-INTA
Andrea Santangelo, IAA, Universität Tübingen

Local Organizing Committee

Massimo Frutti, IASF-Roma, INAF
Franco Giovannelli, IASF-Roma, INAF (Chairperson)
Chiara Pala de Murtas, IASF-Roma, INAF
Paolo Persi, IASF-Roma, INAF
Francesco Reale, ARTOV-CNR

FOREWORD

The **Frascati Workshop** on ***Multifrequency Behaviour of High Energy Cosmic Sources*** is a classical biennial meeting held in the same historical place for our workshops: the beautiful and wild island of Vulcano. We are completely convinced that a deep discussion on the multi-frequency behaviour of high energy cosmic sources, defined mostly by the physical processes rather than the types of objects, is the most powerful way for a better and faster development of our knowledge of the physics governing our Universe. For this purpose, we invited distinguished colleagues representative the most important space– and ground–based experiments of the present generation. They painted the whole panorama on the experimental results and on their interpretation by using current models and/or developing new ideas for a better comprehension of the detected phenomena. During the discussion of a lot of new results, obtained along most of the electromagnetic spectrum, we have learned that the astrophysics of galactic sources is still extremely interesting and unavoidable. Indeed it provides crucial information on the same physical processes occurring also in the extra–galactic sources, with obvious different scale factors. Moreover, new results coming from very high energy γ-ray experiments have shown the richness — and its potential increase — of the sky at those energies having detected more than 75 cosmic sources until few years ago completely unknown, but hopefully to be detected since the cosmic ray spectrum extends up to energies as high as $\geq 10^{20}$ eV. The fluxes of very high energy γ-rays are attenuated because of their interactions with the cosmic radio, microwave, infrared and optical radiation fields. Measurements of the flux attenuation can then provide important information on the distribution of such fields. Then, very high energy γ-ray astronomy is the most powerful tool for solving the problem about the origin of cosmic rays.

Many thanks to the authors, which accepted our reminders recalled at the beginning of the workshop, for keeping to schedule. However, in spite of the accurate respect of the dead line of a number of authors, we still suffer a delay in publishing these proceedings because of the laziness of a considerable part of other authors. In spite of this, these proceedings will appear within one year from the workshop date.

This is the eighth edition of the workshop (ninth if we consider the first historical one, held in Vulcano in 1984), whose proceedings are published, once again, by the 'Memorie della Societá Astronomica Italiana', after a break of three editions, which were published by the Chinese Journal of Astronomy and Astrophysics.

We would like to thank all participants and especially the speakers for their active contributions in rendering this workshop updated with their talks, alive with their discussions, and friendly with their attitudes. Particular thanks to: Mr Massimo Frutti for his excellent technical assistance in Roma, Emanuela Brunetti for her good assistance for informatics during the preparation of the workshop, Francesco Reale for his faultless assistance for informatics in Vulcano. Massimo Frutti, a pillar of our workshops, for the first time did not attend the workshop because of an unfortunate setback: a fracture of his right foot.

A very special thank to Lidia Barbanera, who joined us in Vulcano for the management of the workshop. She is one of the three pioneers of the Frascati Workshop LOC, together with Massimo Frutti and one of us (FG).

We are grateful to the pianist Maestra Valentina Usai and to the violinist Alessandro Perpich for their wonderful concert hosted in the *Madonna del Rosario* church in Vulcano, and especially prepared for the Silver Jubilee of the Frascati Workshop.

Many thanks to:

- the director of the *Istituto di Astrofisica Spaziale e Fisica Cosmica, Roma of the Istituto Nazionale di Astrofisica (IASF-INAF)* (Dr Pietro Ubertini);
- the director of the *Institute für Astronomie und Astrophysik, Karls Eberhard, Universität SAND 1 (IAAT)* (Dr Andrea Santangelo);
- the CAEN S.p.A. (Viareggio)

who partially supported the organization of this workshop.

Particular thanks to the *Plan Nacional de I+D+i* of Spain for partially supporting the publication of this book.

Finally, we would like to thank Mr Daniele Inzerillo, the Chef of the Eolian Hotel, who delighted us with his creations during our stay and to the whole staff of the Hotel for their professionalism and kindness.

The Editors
Franco Giovannelli and Lola Sabau-Graziati