

Forewords

This is the third report of the scientific activities of the Physics Department of the University of Salento and of the Lecce division of the National Institute of Nuclear Physics (INFN). The scientific activities of these two institutions have been, at least up to now, so strictly related that it was difficult to disentangle their specific contributions. This will be the last time we report on our scientific work under the name of Department of Physics. After more than 30 years the profound changes induced by the University legislation in Italy from the beginning of the 2012 have modified the Department. Almost all the Physicists and the Mathematicians of our University have joined to form a new and bigger Department called *Dipartimento di Matematica e Fisica “Ennio De Giorgi”*.

As mentioned in the previous annual reports, there are many reasons behind the decision of publishing an Annual Report, but the motivation we consider more relevant is that we strongly believe that any public institution should allow everybody to know the results of its activity.

We would like to point out the fact that the contributions and the data included in the annual report, have been collected on a volunteer basis. For this reason the present report is neither exhaustive nor complete: It simply want to testify the wide range of scientific subjects and interests covered by the researchers of the Department and of the INFN division. At the same time it gives the flavour of the big steps forward that the Lecce physicists community has made since its birth occurred, scientifically speaking, less than 40 years ago. With some pride I recognize that we are now a strong physics center in the community of national and international research, with scientific teams of high international reputation, visibility and quality production in several fields.

We thank all the colleagues who worked in the construction of this report, by writing contributions, by sending the list of their activities, by helping us in correcting the errors and inconsistencies of the various drafts. We hope that their, and ours, efforts will be useful to the reader and to the management of the new, and we really hope, very successful Department of Mathematics and Physics.

The Director of the
Dipartimento di Fisica
Prof. **Armando Blanco**

The INFN division of Lecce started his activities in 1989 in tight collaboration with the Physics Department in the fields of High Energy Physics, Astroparticle, Nuclear Physics, and Theoretical Physics. Since then, most of the University staff participate more or less closely to the INFN projects. At the same time, INFN established in Lecce a small but fierce staff of researchers and technicians which have given a big boost to the involvement in INFN experiments and to the technical services which are managed jointly with the Physics Department: Computing and Networking, Mechanics and Electronics.

In 2011 in the field of Elementary Particle Physics, the main event was the stable data taking of LHC experiments; the ATLAS Lecce group was involved in data taking, monitoring of the apparatus, software development and data analysis, with contribution to different physics items. At the same time activities on future experiments and development of a new detector based on diamond were started.

In the field of Astroparticle Physics the two major experiments, ARGO-YBJ and Auger were in full data taking and produced the physical results presented in this report. Moreover, an exploratory experiment on the microwave emission from air shower plasmas and an outreach activity for the construction of a detector which replicate some classic measurement on cosmic ray were started.

The theory group continued its well established activity in String and Field Theory, Phenomenology of Elementary Particles, Neutrino and astroparticle physics, Nuclear and Many-body Physics, Astrophysics, Non-linear dynamics and Statistical Physics and also on Foundations of Quantum Mechanics.

For the future, I hope that the collaboration with the novel Department of Mathematics and Physics will be as tight and profitable as it was with the Department of Physics.

The Director of the
INFN, Sezione di Lecce
Prof. **Giovanni Mancarella**