

NEWSLETTER 09

Italian National Institute for Nuclear Physics

MARCH 2015

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RESEARCH

LHC, LAST CHECK BEFORE THE RESTART

After a two-year break, the LHC, the super particle accelerator of CERN in Geneva, is giving end to the last check before launching its second period of activity, the Run 2, thus restarting its research. Even more powerful, it will achieve energy levels hitherto never explored by physicists in the laboratory. The machine was switched off on 14 February, 2013 to enable work to be carried out that has led to its increase in performance. With a slight delay due to a technical accident occurred in a connection between a magnet and its diode, Run 2 is about to begin. Thus, shortly, the first proton beams will be injected into the 27-kilometre ring of the particle accelerator, while the first particle collisions are expected in the next months.

In the enhanced version, the LHC will operate with almost double the energy of its predecessor, reaching 13 TeV at the point of particle collision. This will allow physicists to look for signs of physics beyond the Standard Model, the theory that today represents our best description of nature, of elementary particles and their interactions. It will also be an opportunity to verify theories that in the first stage were impossible to test, from dark matter, to super-symmetry and extra dimensions. ■



NOMINATION

FROM GERMANY TO ITALY TO GUIDE THE TIFPA INSTITUTE IN TRENTO

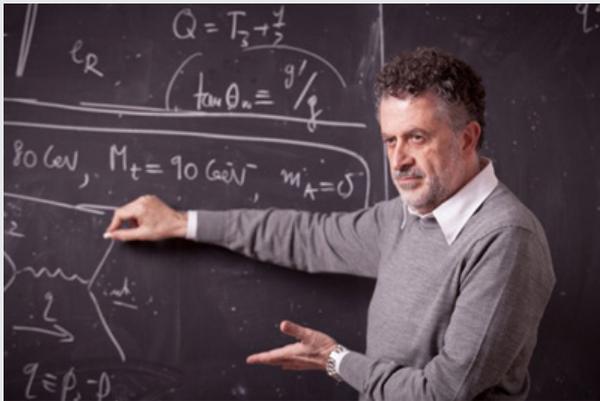
Marco Durante, researcher of the highest international profile, has been appointed as the new director of the TIFPA institute in Trento (*Trento Institute for Fundamental Physics and Application*) the INFN National Centre established in January 2013 in collaboration with the *University of Trento*, the *Bruno Kessler Foundation* and the *Health Services Agency* of the Province of Trento. Professor at the *Technische Universitaet Darmstadt*, Marco Durante is also adjunct professor at the *University Federico II* in Naples, at the *Temple University* in Philadelphia (USA) and at the *Gunma College of Medicine* in Japan. Since the year 2007, he is Director of the Department of Biophysics at the GSI Helmholtz Center in Darmstadt, Germany. Marco Durante is recognized by the world scientific community as a leader in the field of radiobiology of charged particles, radiation protection in space and medical physics in the context of cancer therapy with ions, with over 250 publications in the field and a European patent.

With the new appointment, Marco Durante brings to Italy an exceptionally valuable international experience. He worked in the United States at the *Lawrence National Laboratory*, at the *NASA Johnson Space Center*, at the *Brookhaven National Laboratory*, and at the *National Institute of Radiological Sciences* in Japan, being coordinator of international research projects and receiving numerous awards for his innovative research. He is currently president of the *International Association for Radiation Research* (IARR). ■



WORKSHOP NEUTEL 2015, SPOTLIGHT ON NEUTRINOS

At the beginning of March, opened by a lecture from Nobel Laureate Carlo Rubbia, the 16th edition of the biennial meeting *International Workshop on Neutrino Telescopes* was held. The Conference, organised by the INFN of Padua, in collaboration with the Department of Physics of the University of Padua, was hosted in Venice by the Venetian Institute of Science, Letters and Arts. More than one hundred physicists, most coming from abroad, took part in the workshop in order to outline the state of the art of neutrino physics, a research field from which we expect major progress in the knowledge of our universe. Great importance was given to neutrino telescopes: from the *IceCube* experiment in the South Pole, to the *Km³NeT* project, the European initiative promoted by INFN for an underwater observatory in the Mediterranean Sea off Cape Passero, in Sicily. Much of the discussion was also dedicated to the Gran Sasso National Laboratories of INFN, the largest underground laboratory in the world for astroparticle physics research, which hosts, among others, the solar neutrino and "double beta" decay detectors for the study of extremely rare processes and for the search for dark matter. Among the projects of the near future, the large-scale international projects for the study of neutrino oscillation, such as Juno (*Jiangmen Underground Neutrino Observatory*), in China, LBNF (*Long Baseline Neutrino Facility*), in the United States and Hyper-Kamiokande in Japan were finally presented. ■

» INTERVIEW

**GRAN SASSO SCIENCE INSTITUTE:
THE INTERNATIONAL PHD SCHOOL PREPARES
ITS THIRD ACADEMIC YEAR**

Interview with Eugenio Coccia, Director of the Gran Sasso Science Institute (GSSI), Professor at the Tor Vergata University of Rome, experimental physicist in the astroparticle research field.

Founded in 2013 in L'Aquila, the Gran Sasso Science Institute (GSSI) is an international PhD school and a research and higher education centre. The GSSI has the objective of training highly qualified human resources, integrating education and research in a lively and interdisciplinary environment promoting a liaison between research and business. The PhD programmes, launched in the 2013-2014 academic year, are in the scientific fields of physics, mathematics, computer science and social sciences for innovation and spatial development management.

Professor Coccia, recruitment of PhD students for the third academic year of the GSSI opened a few weeks ago. It is a rather important event, also because it precedes the ANVUR (National Agency for the Evaluation of the University and Research System) evaluation planned for the end of the year.

What is your assessment of the first two years of activities?

I would say that the assessment is very positive. Together with the leading-edge professors and researchers that we have managed to involve, we have put together a modern and interdisciplinary teaching offer and research programme, immediately attracting a large number of students. In the first two years, we have had over 1,000 applications from all over the world, with a total of 80 students selected, of which about 50% from abroad. I am speaking of young graduates from the best Italian and foreign universities.

Moreover, the relationship with the city, consolidated by the many cultural initiatives and study and debate opportunities, is excellent. I don't think I am exaggerating if I say that we are seen as a reason of hope for the rebirth of L'Aquila.

» INTERVIEW

What was behind the creation of a centre of scientific excellence in L'Aquila?

The presence of the GSSI in L'Aquila was made possible, against the backdrop of the tragic earthquake of 2009, by the impetus of the OECD (Organisation for Economic Cooperation and Development), the commitment of the INFN and the willingness of the Abruzzo Region and the National Government. The OECD recognised the important role of a new institute such as the GSSI in order to relaunch L'Aquila, also thanks to the contribution of the specialised expertise and facilities already present in the area, such as the Gran Sasso National Laboratories.

What is the current and future link with the INFN, the body responsible for activating the project?

The link with the INFN is very strong, not only due to its role as activator. The tradition of scientific excellence of the INFN and its ability to train young people in an international environment have been fundamental to the credibility of the GSSI project. I believe that when the GSSI will be a new independent institution, the area of physics and the astro-particle PhD programme will be organised and managed jointly with the INFN.

What characterises the GSSI as an international centre?

I would like to mention two elements: the synergy with a large world-class research infrastructure, such as the INFN Gran Sasso Laboratories, and the highly interdisciplinary character resulting from its sponsorship by the OECD. The GSSI is not the result of local petitions or affiliation with other universities, two situations in which one can be subjected to particular interests, but of a modern vision of the role of culture and research for the development of a city and a region.

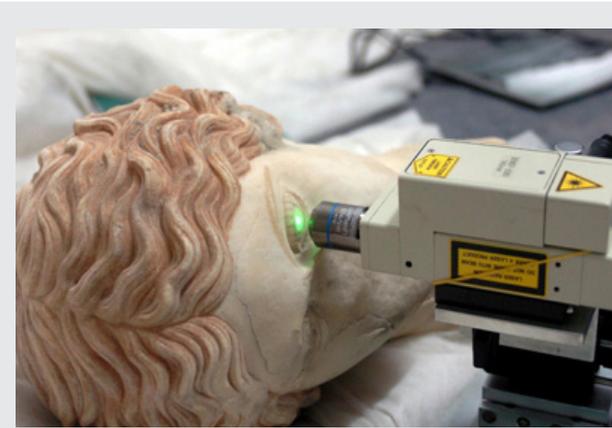
Is it already possible to assess the impact of this new population of international and interdisciplinary researchers on the quality of basic research and on regional development and innovation at the local and national level? What are the expectations for the near future?

It's too early for an impact assessment. Certainly, we are attracting to L'Aquila students and researchers of quality, otherwise destined for other foreign organizations. We are actively committed to designing the future of L'Aquila, promoting studies and research that have as their central themes the quality of life and opportunities for economic development of the city.

Moreover, one should also take into account that the very presence of the GSSI is a factor in the revitalisation of the economic and social fabric of this historic centre. In this regard, it must be underlined

»» INTERVIEW

that the majority of the funds necessary for its operation are transformed into local demand for goods and services. ■

» SPOTLIGHT

**FROM RESEARCH A TASK
FORCE FOR CULTURAL
HERITAGE**

The cultural heritage analysis, preservation and restoration experts have set up a "network" in Italy with IPERION_CH.it, a mobile and integrated task force capable of intervening on works of art, monuments and historical and archaeological finds in situ or in the laboratory, in a non-invasive manner in order to plan the restoration work. The network offers free access to laboratories, portable diagnostic instruments and the technical and scientific skills of interdisciplinary teams of researchers working on selected intervention projects on the cultural heritage.

IPERION_CH.it is funded by the Ministry of Education, Universities and Research with the participation of the National Research Council (CNR), which is the coordinator, INFN, the National Materials Science and Technology Inter-University Consortium and, as infrastructure partner, the Opificio delle Pietre Dure (Workshop of Semi-Precious Stones) which offers its expertise in restoration and history of art.

The interventions currently planned concern: the Mosaic of Alessandro in the House of the Faun of Pompeii, preserved at the National Archaeological Museum of Naples (in progress); a collection of paintings by Pollock at the Guggenheim Museum in Venice (in progress); the Pala di San Bernardino by Piero della Francesca in the Pinacoteca di Brera in Milan; the Trittico del Maestro dei Fogliami Ricamati in the Polizzi Generosa church (Palermo); a number of works of Italian Pointillism at the National Gallery of Modern Art in Rome; the Encounter of the Pilgrims with Pope Ciriaco by Vittore Carpaccio in the Galleria dell'Accademia in Venice and the murals of the cave church of Sant'Angelo di Casalrotto (Mottola, Taranto).

The Italian network is part of a larger project to build a European inter-disciplinary infrastructure for preservation science and technology. (IPERION - *Integrated Platform for the European Research Infrastructure ON Culture Heritage*).

In detail, the newly-born Italian network for cultural heritage, IPERION_CH.it, involves the following: for CNR, Molab-CNR, the mobile laboratory for non-invasive investigation on works of art consisting of the

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Institute of Molecular Science and Technology (ISTM-CNR), the National Institute of Optics (INO-CNR), the Visual Computing Lab (ISTI-CNR) and the SMAArt Centre of Perugia; for INFN, LABEC, Laboratory of Nuclear Techniques for the Cultural Heritage in Florence, LANDIS, Laboratory of Non-Destructive Analysis of the National Laboratories of the South, the National Laboratories Frascati and the Bari, Bologna, Catania, Ferrara, Florence, Milan Bicocca, Naples, Turin sections; INSTM, the National Materials Science and Technology Inter-University Consortium, bringing together 47 Italian Universities engaged in advanced materials research and related technologies and OPD, the Opificio delle Pietre Dure in Florence, a centre of excellence for the restoration and preservation of the cultural heritage and higher education institute. ■

ITALIAN NATIONAL INSTITUTE FOR NUCLEAR PHYSICS

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