

JANUARY 2016

### > INTERVIEW



### ITALY-USA COOPERATION FOR RESEARCH IN FUNDAMENTAL PHYSICS

Interview with Stefano Lami, Scientific Advisor at the Italian Embassy in Washington

In mid-January, in the presence of the Minister of Education, University and Research, Stefania Giannini, and the US Ambassador to Italy, John Phillips, the Italy-USA bilateral meeting for scientific and technological cooperation took place. At the end of the meeting, which was held at the Ministry of Foreign Affairs and International Cooperation, the new joint declaration on scientific and technological cooperation, for the two-year period 2016-2017, was signed by the representatives of the Italian and US delegations. In particular, the Ministry of Education University and Research (MIUR) and the US Department of Energy (DOE) signed a technical cooperation agreement in the field of nuclear physics, concerning the research activities carried out jointly by INFN and DOE. The agreement is linked to the more general accord signed in Washington last July, for cooperation on several fronts: from the detection of neutrinos and dark matter at the Gran Sasso National Laboratories of INFN, to the study of neutrinos at the Fermilab in Chicago and of atomic nuclei at the Jefferson Laboratory in Virginia; from the space program for the study of cosmic rays and antimatter with the Fermi and AMS space detectors, to the detection of gravitational waves with the LIGO and Virgo interferometers and the study of high-energy cosmic rays with the Auger Observatory in the Argentine Pampas. The Italian Embassy in Washington and its Science Counselor, Stefano Lami, played a fundamental role in establishing Italy-USA cooperation for scientific research.

# Even though the horizon of research cooperation has expanded significantly in recent years, the relationship with the USA remains the cornerstone of INFN's international partnerships. What are the reasons for this special relationship?

The bilateral cooperation between Italy and the United States has certainly found, since the end of the Second World War to date, a solid basis for a long-standing and strong friendship in the technical-scientific sector; cooperation which was better defined and fostered by the first inter-governmental agreement in 1988. In the physics field, in particular, the fruitful exchange of know-how between



#### JANUARY 2016

## >> INTERVIEW

the national laboratories involved in joint projects has over the years strengthened - among INFN's international relations - the privileged relationship with the USA.

The Scientific Office of the Embassy in Washington works to facilitate these relationships, hosting periodic meetings between INFN management and that of DOE and of the National Science Foundation (NSF), organising conferences and seminars and supporting the preparation of new agreements. With NSF, we are now looking to expand joint projects with INFN into an international partnership.

To study cosmic signals which are weak or uncertain in their nature, as it is in the case of dark matter, it is compelling to encourage the creation of global observers, providing for an exchange of expertises and scientific results. In this frame, an "Intent Agreement" will be soon approved by INFN and NSF for the joint participation in the Partnership for International Research and Education (PIRE) on mutual interest researches, including dark matter and gravitational waves detection. Referring to this second, in particular, the aim is to facilitate the sharing of scientific results and joint analysis between LIGO and Virgo interferometers, and carry on joint R&D actions for the realization of future third generation interferometers.

### What is the current US strategy in the field of particle physics?

After the closure of the PEP-II and Tevatron accelerators at SLAC (Stanford Linear Accelerator) and at Fermilab in Chicago, respectively, and the attraction of many American physicists towards the LHC at CERN, the P5 (Particle Physics Project Prioritization Panel) report, issued in May 2014, defined the strategy for the next ten years for keeping a line of high quality research in the US while optimising investments. High priority was given to neutrino physics and to relaunch of the Fermilab: both with the neutrino beam of the new Long-Baseline Neutrino Facility, directed to an underground laboratory in Sanford, South Dakota, as well as with two major experiments for the study of muons, Muon g-2 and Mu2e. INFN is present in all these projects. In this regard, the statement given to the US Senate by the director of Fermilab, Nigel Lockyer, during his testimony on the P5 report, according to which "Italy represents its most important international partner", is significant.

# What in your opinion are the peculiarities of the Italian and American research systems? What are the benefits that the two countries can derive from the exchange of skills?

Among the most evident differences, I would say that research in the USA receives much higher contributions in percentage terms from the private sector than research in Italy. American universities play a key role in research and technology transfer is closely related to their projects. Finally, there are many opportunities for young researchers.

Despite the criticism, I think the educational training offered by Italian universities is excellent, at a very low cost compared to the USA. It is unfortunate that in recent years the prospects for young graduates or PhDs are so limited, but perhaps something is changing. Research in particle physics has always been the flagship of Italy, despite the limited funds.



#### JANUARY 2016

## >> INTERVIEW

I would say that a little osmosis of the positive things of the research systems of the two countries would be desirable. In particular, a greater synergy between research agencies is now essential, to share each other's expertise in order to optimize investments. The joint strategy will allow the best opportunities among those made possible by the available resources in each country.

# Last January an existing agreement between MIUR and DOE to facilitate research cooperation in fundamental physics was extended. What are the most important aspects?

On 14 January last in Rome, INFN and MIUR signed a specific extension for Nuclear Physics of a more general agreement signed last July which, in broad terms, aims to meet the needs of future large international partnerships, especially concerning the exchange of personnel and scientific material. Just think of the transfer of the ICARUS detector from the INFN Gran Sasso Laboratories (where it has finished its research program under the guidance of Carlo Rubbia) to Fermilab where, with its 600 tons of liquid argon, it will become an integral part of neutrino research at the American laboratory. There is still much work to be done; I hope, for example, that the competent ministries can in the future simplify entry visas for researchers.

# The recent agreements envisage, among other things, intensification of cooperation with the Jefferson Laboratory, the most important American laboratory for nuclear physics, which sees a significant presence of INFN.

That's right, the new agreement defines the common interests of the US and Italian laboratories involved. Among them is the Thomas Jefferson National Laboratory in Virginia, where the recent upgrade to an energy of 12 GeV of the CEBAF (Continuous Electron Beam Accelerator Facility) envisages a research program over the next five years, which will involve about 60 INFN researchers and technicians.

This program will allow us to improve our knowledge on the internal structure of nucleons, on their interactions and on the quark confinement mechanism. This is an important approach for the investigation of the structures of fundamental physics at intermediate energies - with the use of a high-luminosity electron beam - complementary to that carried out at high energies at CERN. As for the LHC experiments, in fact, the goal is to probe the limits of the Standard Model to identify any signs of new physics.