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**STUDYING THE STARS
UNDER A MOUNTAIN: THE
LABORATORIES OF GRAN
SASSO, A STORY OF THIRTY
YEARS OF EXCELLENCE**

15 January was a special day for the National Laboratories of Gran Sasso (LNGS) of INFN. It was the 30th anniversary of the world's most important underground laboratory dedicated to astroparticle physics. The guest of honour for the celebration of this major anniversary was the President of the Italian Republic, Sergio Mattarella, who visited the experimental rooms inside the Gran Sasso mountain massif before meeting the INFN community and leaving a message of thanks and congratulations for the work already completed, as well as best wishes for the future.

In terms of dimensions and worth of the scientific instrumentation, the INFN National Laboratories of Gran Sasso are the biggest and most important underground research centre in the world, where internationally known scientists and Nobel Prize winners conducted their research and continue to operate, names such as Carlo Rubbia and Barry Barish who was awarded a 2017 Nobel Prize for the discovery of gravitational waves. The LNGS were designed and built beneath 1400 metres of rock, to the purpose of exploiting the protection of the mountain against cosmic radiation, which constantly hits the Earth. The Laboratories are therefore immersed in what physicists call 'cosmic silence', which is a necessary condition for carrying out scientific activity involving the study of extremely rare phenomena that are difficult to detect.

In 1979 Antonino Zichichi, then president of INFN, had the remarkable idea of equipping the Institute with a large underground laboratory with leading edge technological structures, to study the new frontiers of physics. This research infrastructure meant that Italy could, for the first time, carry out a scientific enterprise that was unique in the world and would therefore be able to attract physicists from every continent. The excavation works for constructing the underground rooms started in 1982 and in 1987 the laboratories were able to start their scientific activities and host the first experiments.

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The LNGS are around 120 km away from Rome, in the region of Abruzzo, inside the motorway tunnel between the towns of L'Aquila and Teramo, which passes for 10 km inside the Gran Sasso massif. They are equipped with three large rooms for experiments, each one is about 100 m long, 20 m wide and 18 m high, together with service tunnels, making up a total volume of 180,000 cubic metres. The laboratories are used today as a structure on a worldwide level by scientists from around thirty different countries: currently there are around one thousand people engaged in around fifteen experiments at various stages of completion.

The main areas of research of the current scientific programme of the LNGS are the physics of neutrinos, those produced naturally, either by nuclear reactions in the Sun or by supernova explosions; direct research of dark matter; and the study of nuclear reactions of interest for astrophysics and for the understanding of rare decays.

Because of their structural characteristics, their leading edge experimental equipment and the competencies of the researchers that have worked here over these thirty years, the INFN National Laboratories of Gran Sasso represent a leading international infrastructure on a worldwide level in fundamental physics research and a priceless resource for the area and the whole country, as a centre of production of science and knowledge that is unique in the world, with a history of excellence, part of the tradition of Italian physics. ■