Gran Sasso National Laboraty

Gran Sasso National Laboratory
ss 17 bis km 18,910 Assergi (AQ) ITALY
www.lngs.infn.it - info@lngs.infn.it - tel. +39 0862 4371

INFN

underground physics

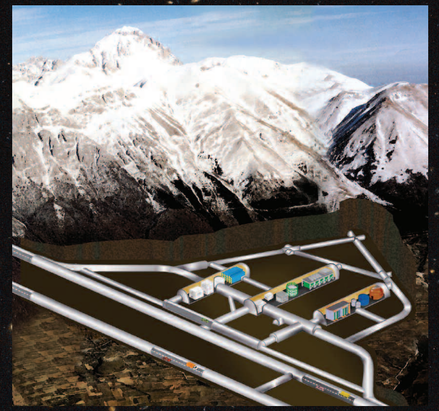
Both the external and internal structures of Gran Sasso National Laboratory are inside the "National Park Gran Sasso and Monti della Laga".

For its dimensions and scientific facilities, Gran Sasso National Laboratory (LNGS) is the biggest and most important underground research center in the world. It was designed and built with the main purpose to take advantage of the protection from cosmic radiation ensured by over 1400 m of mountain overhead, thus allowing to study otherwise hard to observe particles.
The LNGS is financed by the National Institute for Nuclear Physics (INFN), the Italian entity that coordinates and funds research in nuclear, subnuclear and astroparticle physics.
The idea to provide INFN with a large underground laboratory, devoted to fundamental physics, was conceived in 1979 thanks to Antonino Zichichi, at that time President of INFN. The cost for the construction of the underground halls, started in 1982, was 77 billion Lire.

Located along the Gran Sasso highway tunnel, 10 km long, between Teramo and L'Aquila, at about 120 km from Rome, the Labpratory is a world-wide structure used by scientists coming from 24 different countries; at present 750 scientists are engaged in about 15 experiments in different phases of realization.

The underground structures consist of three huge experimental halls, each one 100 m long, 20 m large and 18 m high, for a total volume of about 180.000 m^3.
The underground laboratory is located to the side of the highway tunnel that crosses the Gran Sasso massif, direction Teramo-Roma. Due to the great amount of water inside the mountain, the natural temperature is about 6-7 °C and the humidity almost 100% year round.

In order to obtain a favorable environment for the activities carried on, the experimental halls are waterproofed and heated.
The ventilation, provided by a long conduct that runs along the highway tunnel, convoys about 35,000 m^3 air per hour from outside.

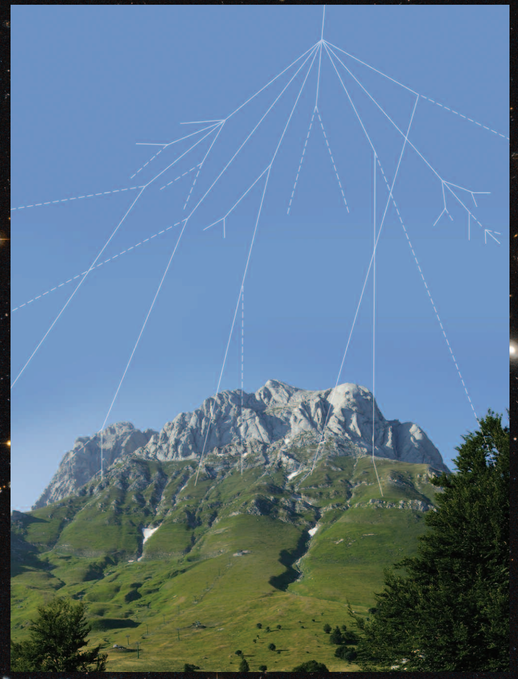


The overhead cover of more than 1400 m of rock is able to reduce the flux of cosmic rays by a million times. Moreover, the natural radioactivity in the underground halls is a thousand times lower than on the surface; the Dolomite rock of Gran Sasso massif has a very small amount of Uranium and Thorium, the main elements responsible for natural radioactivity.

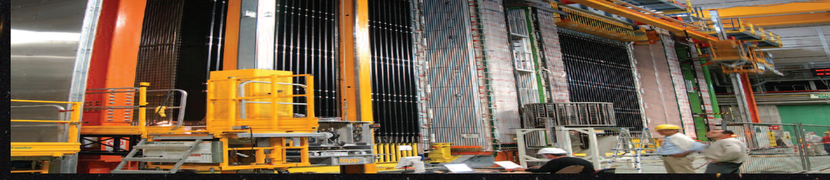
cosmic shower

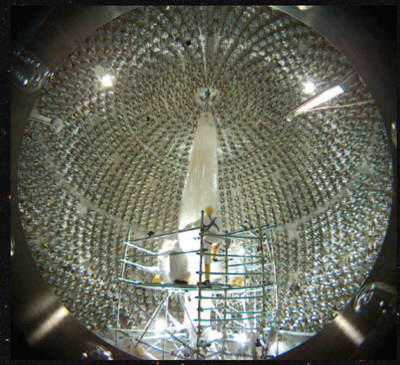
The main task of the Gran Sasso National Laboratory is to host experiments that need a low radioactive background.

Cosmic rays, galactic and extragalactic particles, continuously hit the Earth's atmosphere. From the interaction of these particles with the atmosphere arises a shower of secondary particles that are a relevant disturbance for the experimental apparata designed to study extremely rare phenomena and particles very difficult to observe, such as neutrinos or dark matter.



Particle physics and nuclear physics experiments, as well as other disciplines such as biology and geophysics, take advantage of the features and infrastructures of the Gran Sasso National Laboratory.





looking for answer

**How did the Universe begin?
How do stars work? Which is the nature of neutrinos? What is dark matter?**

The scientists working on the experiments set up in the underground laboratory will try to answer these and other questions concerning the mysteries of the Cosmos. The study of the nature of neutrinos, the search of dark matter, the study of nuclear reactions in the stars and rare decays, allow us to open a new window to observe cosmic phenomena that provide us fundamental information about origin and evolution of the Universe.