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Canfranc Underground Laboratory is ready to go



In the cosmic silence under Spanish mountains the new Canfranc Underground Laboratory is opening. Firstly dedicated to dark matter research, it is also open to other fields such as geology, biology and environmental sciences.

The underground facilities of the Laboratorio Subterráneo de Canfranc (LSC) have been completed and delivered by the University of Saragossa on 30 June 2010. Support services are hosted in a surface building, whose construction will be completed by end 2010.

LSC is dedicated to basic research in a number of fields, which can profit from its unique location deep underground under the Spanish Pyrenees, the site provides 2500 metre water equivalent of shielding from cosmic rays and offers a low background environment for the next generation of experiments exploring the frontiers of particle and astroparticle physics. The main scientific goal is the search for naturally occurring extremely rare phenomena. Other scientific disciplines including geology, biology, environmental sciences, etc. can also profit from the unique location of the Laboratory. LSC is run by a consortium between the Spanish "Ministerio de Ciencia e Innovación", the Government of Aragon and the University of Saragossa.

Canfranc

*The main hall. Background characterisation. August 2010
(Credit: LSC).*

Under 850 m of rocks

The history of underground research at Canfranc dates back to the middle of the 1980s, when A. Morales and his nuclear and high-energy physics group from the Universidad de Saragossa started to develop underground facilities in an abandoned railway tunnel under the Pyrenees. The first infrastructure consisted of two small existing galleries (12 m²) and a small barrack hut (20 m²). In 1994, a dedicated cavity was built (100 m² at 850 m depth), in which experiments for dark matter searches were performed.

More recently, the construction of a road tunnel between Spain and France, parallel to the railway one, provided a unique opportunity. A. Morales, with a successful record of two decades of research and determination, convinced the Spanish authorities of building a new, larger laboratory, with fully international standards. It has two experimental halls (40x15x12 m and 15x10x7 m) and all the necessary underground services. The facility was completed and inaugurated in 2006. However, one year later signs of rock instabilities started to appear and the laboratory was closed. A complete revision of the original project was performed by the Saragossa University and the rock support structures necessary to guarantee the safety of the personnel and of the properties were installed. Moreover, a dedicated structure of optical fibers now continuously monitors rock stability.

Canfranc
(Credit: LSC).

Totally funded by Spain, LSC is open to international users. Frontier research requires frontier experimental technology. To cope with that, LSC provides not only the "cosmic silence" conditions thanks to the mountain filtering the cosmic radiation, but also the necessary technical, administrative and logistic services, including safety, support for installations, electricity and electronics, low background measurements, chemistry, clean rooms on surface and underground, computers, networks and communication, mechanics and cryogenics.

The main lines of the scientific programme currently being developed and overviewed by an international advisory scientific committee include the search of dark matter, neutrino physics or nuclear astrophysics. In addition, LSC will allow for environmental research and studies of the earth from under its surface and of life in extreme conditions.

Canfranc

*Support services are hosted in a surface building,
whose construction will be completed by end 2010 (Credit: LSC).*

Six experiments have already been approved (ANAIS and ROSEBUD on dark matter, BiPo, NEXT and SuperK-GD on neutrinos and GEODYN on geodynamics) and more are under discussion (ArDM on dark matter and CUNA on nuclear astrophysics).

With LSC, Spain is back into the club of countries hosting facilities for deep underground science in Europe such as France with Laboratoire Souterrain de Modane, Italy with Laboratori Nazionali del Gran Sasso and the United Kingdom with the Boulby Underground Laboratory. Bienvenido!

Submitted by A. Bettini - LSC Director

> LSC' s website: <http://www.lsc-canfranc.es/>

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