LABORATORI NAZIONALI DEL GRAN SASSO

SEMINAR ANNOUNCEMENT

Ioanni Giomataris

CEA-Saclay

"Ultra low energy results with the spherical detector and trends in low energy neutrino physics and dark matter search"

Abstract

The new detector based on a spherical geometry will be presented. The detector consists of a large spherical gas volume with a central electrode forming a radial electric field. A small spherical sensor located at the center is acting as a proportional amplification structure. This new concept has been proven to operate in a simple and robust way and allows reading large volumes with a single read-out channel. It allows high gas gains to be reached and operates in a wide range of gas pressures. Filled with 3He gas provides a high-resolution massive neutron detector; recent results at ground and underground will be presented. Sub-keV energy threshold with good energy resolution is achieved. The energy threshold has been pushed down to about 20 eV and single electrons are clearly collected and detected. To reach such performance low energy calibration systems have been successfully developed:

- A pulsed UV lamp extracting photoelectrons from the inner surface of the detector
- Various radioactive sources allowing to provide low energy peaks through fluorescence processes.

Such a device would open the way

• to measure the neutrino-nucleus interaction, which, although a standard process, remains undetected due to the low energy of the neutrino-induced nuclear recoils. We will discuss the sensitivity of our present device to confirm this process by using neutrinos from a nuclear reactor.

• To detect neutrinos from supernova explosion, through neutrino neutral current process, using a high pressure sphere 4 m in diameter. A world wide network of several such simple, stable and low cost supernova detectors with a running time of a century is proposed.

• Explore at underground laboratory (LSM) the sub-keV energy range. For this a new detector, 60 cm in diameter, made out of low background materials and surrounded by appropriate is under study. Such device could be useful to shed light on excess signals observed at low energy and possible connection with dark matter interactions.

MAY 6, 2010 - 2:30 PM
LNGS - "B. PONTECORVO" ROOM