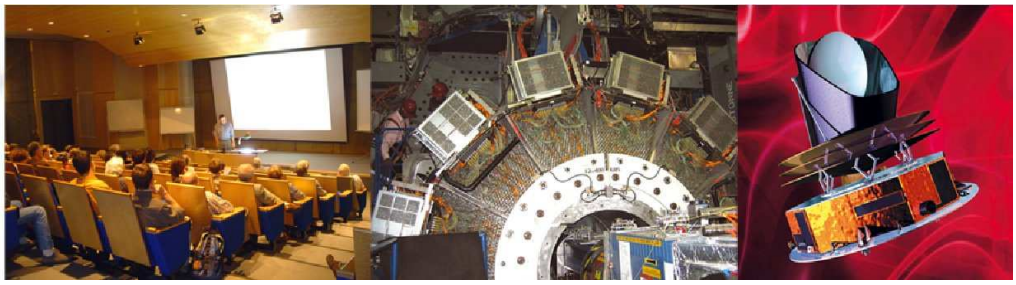
LABORATOIRE DE L'ACCÉLÉRATEUR LINÉAIRE



Séminaire du Laboratoire de l'Accélérateur Linéaire

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Mardi 3 Novembre 2015 à 11 :00

Advance in particle detectors and new physics

Micropattern gaseous detectors (MPGD), especially Micromegas and GEM are widely used by many experiments and future projects. The high radiation resistance and the excellent spatial and time resolution make them an invaluable tool to confront future detector challenges at the next generation of colliders. I will present a quick review on principle and basic performance of Micromegas detector. I will point out new developments that are currently under way and especially novel industrial ways of fabricating the detector in a single process. The detector is used in several projects in particle and nuclear physics : COMPASS, CAST, RICH, NA48, CLAS12G, n-TOF, ILC, T2K, ATLAS-sLHC, CMS-sLHC. I will give details on last development aiming to reach picosecond time resolution a challenge for future LHC high luminosity upgrades. The detector is used in CAST for solar axion search. The achieved low background level greatly improves the sensitivity of the experiment and suggests novel investigations. A new type of radiation detector based on a spherical geometry will also 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. Sub-keV energy threshold and versatility of the target (Ne, He, H) opens the way to search for ultra light dark matter WIMPs down to 100 MeV. Results obtained with a low radioactivity detector, 60 cm in diameter operated in Laboratoire Souterrain de Modane (Frejus lab) will be presented. The measured background level is competitive with the best germanium detectors and the threshold was set at 50 eV. Exclusion plots for WIMPs are very-competitive with existing projects. The next project, under study, is a larger detector that consists in a selected pure copper sphere of 2 meter of diameter to be installed at SNOLAB. This will allow benefiting from a 40 times larger volume, relative to the current detector. I will point out the way to detect the neutrino-nucleus interaction and neutrinos from supernova explosions. Finally I will explain the optimization of such detector for a competitive double beta decay experiment using Xe-136 high-pressure target.

Salle 101 du LAL - Bât. 200, Orsay

Thé et café seront servis 5 mn avant le séminaire