CENTRE D'ETUDES NUCLÉAIRES DE BORDEAUX-GRADIGNAN

Vendredi 27 Février 2015

à

11H00

Un café sera servi à partir de 10h45

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Scintillating bolometers as promising detectors to search for neutrinoless double-beta decay

Neutrinoless double-beta decay (a very rare hypothetical nuclear transformation) is a key process for understanding several fundamental problems, such as the lepton number non-conservation, the origin and the absolute scale of the neutrino masses, the ordering of neutrino mass eigenstates, right-handed current admixture in the weak interaction and some other effects beyond the ordinary Standard Model of particle physics. This process has not been observed yet in spite of enormous experimental efforts over the last 75 years.

A new / advanced technology is proposed and discussed in order to significantly improve the best to-date sensitivity to the process and to investigate existence of neutrino mass corresponding to an inverted hierarchy mass pattern. A significant progress on the development of scintillating bolometers (cryogenic particle detectors) achieved over the past decade demonstrates the capability of this technology to be used in next-generation neutrinoless double-beta decay experiments. This statement is based on the excellent spectrometric performance of such devices, typical for bolometers (high energy resolution and detection efficiency), powerful pulse-shape discrimination (feature thanks to heat-light double read-out), and possibilities to develop highly radiopure crystal scintillators (with activity of ^{228}Th and ^{226}Ra below 0.01 mBq/kg).

The present review will summarize the results of recent R&D's of the scintillating bolometer technique for high-sensitivity searches for neutrinoless double-beta decay. The main focus will be devoted to France-funded program LUMINEU (Luminescent Underground Molybdenum Investigation for NEUtrino mass and nature) and to its natural development dubbed LUCINEU.

Salle des Séminaires du CENBG

Le Haut Vigneau - BP 120 - F-33175 Gradignan Cedex