

**CENTRE D'ÉTUDES NUCLÉAIRES DE
BORDEAUX-GRADIGNAN**

Vendredi 3 Mars 2017

à 11H

Un café sera servi à partir de 10h45

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**Entering the era of precision neutrino physics:
the role of short- and medium-baseline reactor experiments**

Neutrinos are among the primary constituents of our Universe. Albeit their first postulation dates back to more than than eighty years ago (Pauli 1930), they still lack a coherent treatment within the Standard Model (SM) of Particle Physics. At the heart of this flaw lies the issue of neutrino mass. Neutrinos are indeed described as massless particles within the SM Lagrangian, while we now have compelling evidence for them to be massive. This evidence stems from the experimental observation of neutrino oscillation (Super-Kamiokande 1998, SNO 2001, Nobel Prize 2015), a phenomenon which allows neutrinos produced in a given flavor eigenstate to be later detected carrying a different flavor. Precisely measuring the parameters governing the oscillation mechanism has, since then, become one of the main handles to investigate neutrino physics.

Nuclear power plants are among the most powerful artificial sources of electron antineutrinos. They were used in 1956 by Cowan and Reines to provide the first experimental evidence for the antineutrino existence (Nobel Prize 1995), and they are still being exploited nowadays to perform frontier research. When electron antineutrinos are detected at various distances from the source (i.e. at various baselines), they allow to probe several properties of the oscillation mechanism, such as the probability for them to change flavor, and the frequency with which they oscillate from one flavor to another.

Showing how liquid scintillator antineutrino detectors located at short (~1km) and medium (~50km) baselines are being exploited to precisely test our knowledge of neutrino physics will be the main aim of this seminar. I will deal in particular with two case studies: (i) the measurement of the mixing angle θ_{13} by means of the Daya Bay and Double Chooz experiments, and the determination of neutrino mass ordering with the JUNO experiment.

Salle des Séminaires du CENBG

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