Contribution ID: **1** Type: **Oral**

The SoLid experiment searching for anti-neutrinos short baseline oscillations at SCK•CEN BR2 reactor

Tuesday, 17 October 2017 15:30 (20 minutes)

The revaluation of the reactor flux for θ13 experiments lead to a deficit of measured anti-neutrinos compared to theoretical prediction. This so-called the Reactor Anti-neutrino Anomaly (RAA) could be explained by flavor oscillations to a new type of neutrinos: the sterile neutrino.

The SoLid experiment intends to search for active-to-sterile anti-neutrino oscillations at the very short baseline (5-9 m) of the SCK•CEN BR2 research reactor (Mol, Belgium) to address the RAA. A novel detector approach to detect the reactor anti-neutrinos was developed based on an innovative hybrid scintillator technology combining PVT and 6LiF:ZnS scintillators. The first scintillator serves as an anti-neutrino target for Inverse Beta Decay (IBD) reaction and measure the positron energy. The second scintillator tag the neutron capture on 6Li and measure the characteristic IBD delay time. The system is highly segmented (5 cm) and read out by a network of wavelength shifting fibers and MPPCs. High experimental sensitivity can be achieved compared to other standard technologies thanks to the combination of high granularity, high neutron-gamma discrimination using 6LiF:ZnS(Ag) scintillator and precise localization of the Inverse Beta Decay products. The reconstruction of the full topology of the events allows a strong background rejection which will be necessary given the low overburden at the reactor building.

In this contribution to CNNP 2017, we will describe the detection principle demonstrated by the 300 kg prototype deployed in 2015. We will then present the performances improvements compared to this prototype thanks to dedicated test benches studies. To be continued by the construction and integration of the full scale detector (up to 2 t) for which construction is already well advanced. Intensive calibration (gamma and neutron) campaigns directly follow the construction of the planar detector elements and first data taking at the reactor site are expected by July 2017. The status of these calibrations and commissioning will be presented before concluding on the perspectives and the expected sensitivity.

Dr Mathieu Bongrand
bongrand@lal.in2p3.fr
LAL –Centre Scientifique d'Orsay –Bat 200 –BP 34 –91898 Orsay Cedex –France

Primary author: Dr BONGRAND, Mathieu (LAL CNRS)

Presenter: Dr BONGRAND, Mathieu (LAL CNRS)

Session Classification: Parallel