Contribution ID: **45** Type: **Oral**

The CROSS experiment: rejecting surface events with PSD

Tuesday, 25 February 2020 14:20 (20 minutes)

Neutrinoless double-beta decay is a hypothetical rare nuclear transition (T^1/2>1026 y). Its observation would provide an important insight about the nature of neutrinos (Dirac or Majorana particle) demonstrating that the lepton number is not conserved. This decay can be investigated with bolometers embedding the double beta decay isotope, the possibility to investigate this rare process is strongly influenced by the background level in the region of interest. A new R&D has recently begun within the CROSS project (Cryogenic Rare-event Observatory with Surface Sensitivity) aiming at the development of bolometric detectors, embedding the promising isotopes 100Mo and 130Te, capable of discriminating surface alpha and beta interactions by exploiting the properties of superconducting material (Al film) or normal metal (Pd film) deposited on the crystal faces (Li2MoO4 and TeO2). These films work as pulse-shape modifiers. The results of the tests on prototypes performed at CSNSM (Orsay, France) showed the capability of a few-μm (nm)-thick Al (Pd) film deposited on the crystal surface to discriminate surface from bulk events, with the required rejection level of the surface background. While Al film can only identify surface alpha particles, there are preliminary indications that normal-metal films can separate also the beta surface component. This is a breakthrough in bolometric technology for double beta decay that could lead to reach a background index in the range 10^-5 counts/(keV kg y). The CROSS cryostat has been recently installed underground (Canfranc, Spain). We plan to run the first CROSS demonstrator in 2021 with 32 enriched Li2100MoO4 crystals containing ~5 kg of 100Mo. A 5-year sensitivity to the effective Majorana neutrino mass mββ with a background of the order of 10^-3 counts /(keV kg y) would be in the range 68-122 meV (2.8 × 10^25 y), at the level of the best currently running experiments.

Primary author: KHALIFE, Hawraa (CSNSM-cnrs (orsay, France))

Presenter: KHALIFE, Hawraa (CSNSM-cnrs (orsay, France))

Session Classification: Contributed Talks