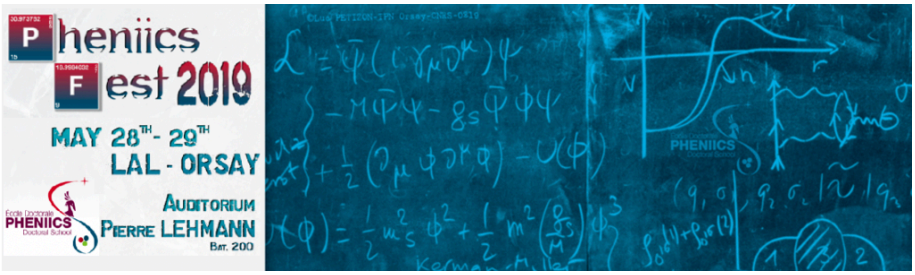

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Rejection of surface events in macrobolometers by means of Al-film crystal coating

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Neutrinoless double-beta decay is a hypothetical rare nuclear transition (T1/2>1026 yr) and its observation would imply lepton number violation and Majorana nature of neutrinos (ν^{-}=ν), allowing to determine the absolute scale of the neutrino mass and to probe effects beyond the Standard Model. In this transition two neutrons decay simultaneously into two protons and two electrons and it is allowed for 35 nuclei (100Mo, 130Te⋯). This decay could be studied with large mass bolometers operated at 10-20 mK which are among the best energy resolution particle detectors. A bolometric absorber can be developed from highly radiopure materials and can contain the ββ-decay candidate nucleus. Background induced by charged-particle surface radioactivity is currently the limiting factor in large-scale bolometric experiments like CUORE. 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 capable of discriminating surface alpha and beta interactions by exploiting superconducting properties of Al film deposited on the crystal surface. The crystals studied in CROSS are Li2MoO4 and TeO2. The first prototypes operated at CSNSM showed that a-few-μm-thick Al film deposited on one of the crystal's surfaces can efficiently discriminate surface alpha particles from bulk events. The CROSS technology has the potential to further improve the background suppression in bolometers for double beta decay and simplify the detector construction in large-scale setups.

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