

Sub-keV Neutrino and Dark Matter Physics with Ultra-Low-Energy Germanium Detector

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We present in the poster the status of an R&D program towards the goal of an ultra-low-energy germanium (ULEGe) detector at threshold of 100 eV with an active target mass on the order of 1 kg and a background near threshold at the range of 1 event/kg-keV-day [1]. The scientific objectives include the studies of neutrino-nucleus coherent scattering and neutrino magnetic moments, as well as WIMP dark matter searches at the low WIMP mass range. Such detectors would also have potential implications in reactor monitoring for security purposes. A threshold of 220 eV has been demonstrated with a prototype 4-channel ULEGe array with a total mass of 20 g [2]. Competitive limits have been derived for WIMP-nucleon couplings for WIMPs with mass less than 10 GeV. Scale-up plans are described.

1. H.T. Wong, arXiv: hep-ex/0803.0033 (2008).
2. S.T. Lin et al., arXiv: hep-ex/0712.1645 (2007).