

Deciphering Neutrinos and Searching for Dark Matter

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Is the neutrino its own antiparticle? What is its mass? What is the nature of dark matter? These are some of the most profound open questions in particle physics and cosmology. The LEGEND experiment aims to uncover the nature of the neutrino and determine its mass by searching for neutrinoless double-beta decay using 1-tonne of germanium detectors, pushing the discovery sensitivity to an unprecedented level. The KATRIN experiment directly probes the neutrino mass through precise studies of the kinematics of tritium beta decay, achieving world-leading sensitivity. An exciting extension of KATRIN, incorporating the TRISTAN detector, will facilitate a sensitive search for keV-scale sterile neutrinos, a viable dark matter candidate. Furthermore, TRISTAN is under consideration as a key detector component for IAXO, an experiment dedicated to the search for axions, another hypothesized dark matter particle. This talk will provide an overview of the current status and future perspectives of these experiments, highlighting specific contributions from our working group.