

A Low-Temperature Energy Calibration System for the CUORE Bolometric Double Beta-Decay Experiment

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The search for neutrinoless double beta-decay is a unique mechanism to probe the Majorana nature of neutrinos and measure the effective neutrino mass. CUORE, the Cryogenic Underground Observatory for Rare Events, is a next-generation experiment to search for neutrinoless double beta decay in ^{130}Te . Using an array of 988 TeO_2 crystals at 10 mK with a total mass of 207kg CUORE will search for an excess of events above background near the Q-value of 2530 KeV and probe the effective neutrino mass with a sensitivity of a few tens of meV. A precise measurement of the event energy with the bolometer array is crucial for the identification of candidate double beta-decay events. A novel, low-temperature calibration system with ultra-low background is being developed to perform a precise calibration of the energy response of each one of the TeO_2 crystals in the CUORE bolometer array. We present the design, expected performance, and experimental challenges of this low-temperature calibration system.