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Cryogenic verification of the CUORE Detector Calibration System

The Cryogenic Underground Observatory for Rare Events (CUORE) is a ton-scale cryogenic experiment designed to search for neutrinoless double beta decay ($0\nu\beta\beta$) of ^{130}Te. The experiment consists of 988 ultracold TeO_2 bolometers, which act as both the source and detector of this decay. Energy calibration of the detector is crucial for the detection of $0\nu\beta\beta$, which is expected to appear as a monoenergetic peak at the Q-value of this decay. Due to the large number of crystals and extensive shielding around the detector, calibration sources must be placed inside the CUORE cryostat during calibration to uniformly irradiate the bolometers. In addition, these sources must removed during data-taking runs. I will present the design and results of a cryogenic test of the CUORE Detector Calibration System, which confirm that we can deploy radioactive source strings into the cryostat and successfully cool these sources from room temperature to 4 K with only minimal effects on the cryostat.

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