

Poster Session
Submission of Abstract

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Title of the Poster: The commissioning of the CUORE experiment: the mini-tower run

Abstract Text:

CUORE is a ton-scale experiment approaching the data taking phase in Gran Sasso National Laboratory. Its primary goal is to search for the neutrinoless double-beta decay in ^{130}Te using 988 TeO_2 crystals. The crystals are operated as bolometers at ≈ 10 mK taking advantage of one of the largest dilution cryostat ever built. Concluded in March 2016, the cryostat commissioning consisted in a sequence of cool down runs each one integrating new parts of the apparatus. The last run was performed with the fully configured cryostat and the thermal load at 4 K reached the impressive mass of about 14 tons. During that run the base temperature of 6.3 mK was reached and maintained for more than 70 days. An array of 8 crystals, called mini-tower, was used to check bolometers operation, readout electronics and DAQ. Results will be presented in terms of cooling power, electronic noise, energy resolution and preliminary background measurements.

Summary:

The last CUORE commissioning run highlighted that the cryogenic system, involving a Helium-based Fast Cooling System and five Pulse Tubes, is able to cool the cryostat down to 4 K in less than three weeks. The $^3\text{He}/^4\text{He}$ dilution unit permitted to reach the base temperature of 6.3 mK and maintain it, within a range of 0.2 mK RMS, for 70 days. The mini-tower data showed an energy resolution of 8.1 keV at 2615 keV, demonstrating that the CUORE goal of 5 keV at 2527 keV (the $0\nu\beta\beta$ Q-value) is within reach.

Key words: cryostat, neutrinoless double beta decay, bolometers.