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The first neutrino mass measurement of HOLMES

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The absolute mass of neutrinos is one of the most important riddles yet to be solved, since it has many implications in Particle Physics and Cosmology. HOLMES is an ERC project started in 2014 that will tackle this topic. It will perform a model independent calorimetric measurement of the neutrino mass with a sensitivity of the order of 1 eV using 1000 low temperature microcalorimeters detectors (TES) embedded with ^{163}Ho .

After an intensive measurement campaign, the detector fabrication procedure was performed successfully and their response without ^{163}Ho was exhaustively characterized, alongside the capability of readout 32 detectors at the same time with the microwave multiplexing technique.

The custom ion implanter has also undergone extensive testing, and is now ready to perform an implantation at low dose (around 1 Hz per channel) in the TESs for the very first time. These achievements have represented an essential milestone for HOLMES.

In the last quarter of 2023, we're supposed to be taking data from 64 detectors and we should be in an early stage of the analysis. Nevertheless, this low activity phase of the experiment will lead to the most stringent limit ($O(10)$ eV) on the neutrino mass with a calorimetric technique.

In this contribution, I will present the recent experimental results achieved by the collaboration.

Submitted on behalf of a Collaboration?

Yes

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