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Production of the first 163Ho implanted micro-calorimeters for the HOLMES experiment.

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The HOLMES experiment seeks to directly assess the neutrino mass by investigating the electron capture decay spectrum of ^{163}Ho. This involves developing arrays of micro-calorimeters based on Transition Edge Sensor (TES) technology, each implanted with approximately 10^2 Bq/detector of ^{163}Ho atoms.

To incorporate the ^{163}Ho source into the detector while simultaneously eliminating contaminants from other isotopes, a dedicated implantation/beam analysis system has been developed and commissioned at Genoa's laboratory. Following an extensive series of tests and calibration, the commissioning process concluded in 2023, enabling the implantation of a first set of arrays with an anticipated activity of about 1 Bq/detector.

Presently, the ion implanter is being upgraded, including the addition of a focusing stage, an x-y scanning magnet, and a co-evaporation chamber. This upgrade is expected to improve the beam shape and increase the achievable implanted activity in the detector. This paper will detail the machine commissioning, present the results from the implantation runs, and discuss the enhancements in the implanter's performance following the upgrade.

Collaboration

HOLMES Collaboration

Role of Submitter

I am the presenter

Primary author: DE GERONE, Matteo (INFN - Genova)

Presenter: DE GERONE, Matteo (INFN - Genova)

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