

Probing the absolute neutrino mass scale with the Ho-163: the HOLMES project.

Thursday, 27 July 2017 15:30 (15 minutes)

The HOLMES project aims to directly measure the electron neutrino mass using the electron capture decay (EC) of ^{163}Ho down to the eV scale. It will perform a precise measurement of the end-point of the ^{163}Ho calorimetric energy spectrum to search for the deformation caused by a finite electron neutrino mass. The choice of ^{163}Ho as source is driven by the very low Q-value of the EC reaction (around 2.8keV), which allows for a high sensitivity while keeping the overall activities to reasonable value ($O(10^{-2})\text{Hz/detector}$), thus reducing the pile-up probability.

A large array made by thousands of Transition Edge Sensor based micro-calorimeters will be used for a calorimetric measurement of the EC ^{163}Ho spectrum. The calorimetric approach, with the source embedded inside the detector, eliminates systematic uncertainties arising from the use of an external beta-source, and minimizes the effect of the atomic de-excitation process uncertainties.

The commissioning of the first implanted sub-array is scheduled for the end of 2017. It will provide useful data about the EC decay of ^{163}Ho together with a first limit on neutrino mass. In this presentation the current status of the main tasks will be summarized: the TES array design and engineering, the isotope preparation and embedding, and the development of a high speed multiplexed SQUID read-out system for the data acquisition.

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Session Classification: New Technologies

Track Classification: New Technologies