Contribution ID: **258** Type: **not specified**

The Electron Capture in Ho-163 experiment –ECHo

The Electron Capture in Ho-163 Experiment has been conceived to determine the effective electron neutrino mass by the analysis of the end-point region of the calorimetrically measured Ho-163 electron capture spectrum. The key technology is based on metallic magnetic calorimeters (MMC) enclosing Ho-163 which are operated at millikelvin temperature and readout via microwave SQUID multiplexing. First R&D phases have been completed demonstrating the high yield fabrication of large MMC array, the multiplexed readout and the stability of data analysis. Background studies have been performed and indicated that the contribution of natural radioactivity can be kept below the intrinsic background level given by unresolved pile-up events, defined by the activity in each pixel and the time resolution. An independent measurement of the energy available to the decay with sub-eV precision via Penning Trap Mass Spectrometry and a theoretical model based on ab-initio calculations of the electron capture process have been obtained to guide the analysis of the endpoint region. A preliminary analysis of the data acquired during the first ECHo phase, ECHo-1k, corresponding to a Ho-163 spectrum with 126 million events lead to the achievement of the upper limit for the effective electron neutrino mass of 19 eV at 90% confidence level. Presently the ECHo Collaboration is working towards the construction of a large experiment where 20000 pixels enclosing 10 Bq Ho-163 each will be operated with the goal to reach sub-eV sensitivity on the effective electron neutrino mass with two years of data taking.

Author: Dr GASTALDO, Loredana (Kirchhoff Institute for Physics, Heidelberg University)