



The Electron Capture in ^{163}Ho experiment

Main author:

HASSEL Clemens

The Electron Capture in Ho-163 experiment, ECHo, is designed to investigate the electron neutrino mass in the sub-eV range by means of the analysis of the calorimetrically measured spectrum following the electron capture in Ho-163. Arrays of low temperature metallic magnetic calorimeters (MMCs), read-out using microwave SQUID multiplexing, will be used in this experiment. With a first MMC prototype having the Ho-163 source ion-implanted in the absorber, we performed the first high energy resolution measurement of the EC spectrum, which demonstrated the feasibility of such an experiment. In addition to the technological challenges for the development of MMC arrays which preserve the single pixel performance in term of energy resolution and bandwidth, the success of the experiment relies on the availability of large ultra-pure Ho-163 samples, on the precise description of the expected spectrum and on the identification and reduction of background.

We present the plan for a medium scale experiment, ECHo-1k, in which about 1000 Bq of high purity Ho-163 will be ion-implanted into detector arrays. With one year of measuring time we will be able to achieve a sensitivity on the electron neutrino mass below $10 \text{ eV}/c^2$ (90% C.L.), improving the present limit by more than one order of magnitude. This experiment will guide the necessary developments to reach the sub-eV sensitivity.