

# The Electron Capture in $^{163}\text{Ho}$ experiment –ECHO

*Tuesday, 3 July 2018 12:00 (30 minutes)*

Direct determination of the electron neutrino  $m(\nu_e)$  and anti-neutrino mass  $m(\bar{\nu}_e)$  can be obtained by the analysis of electron capture and beta spectra respectively. In the last years experiments analyzing the  $^3\text{H}$  beta spectrum reached a limit on  $m(\bar{\nu}_e)$  of 2 eV. The upper limit on  $m(\nu_e)$  is still two orders of magnitudes higher, at 225 eV.

The Electron Capture in  $^{163}\text{Ho}$  experiment, ECHO, is designed to investigate  $m(\nu_e)$  in the sub-eV region. In ECHO, high sensitivity on a finite  $m(\nu_e)$  will be reached by the analysis of the endpoint region in high statistics and high resolution calorimetrically measured  $^{163}\text{Ho}$  spectra. To perform this experiment, high purity  $^{163}\text{Ho}$  sources will be enclosed in a large number of low temperature metallic magnetic micro-calorimeters which are readout using the microwave multiplexing technique. This approach allows for a very good energy resolution, below  $\Delta E_{\text{FWHM}} < 5$  eV and for a fast time resolution well below 1  $\mu\text{s}$ .

Thanks to the modular approach, the ECHO experiment is designed to be stepwise up-graded. The first on-going phase, ECHO-1k, is characterized by a  $^{163}\text{Ho}$  activity of about 1 kBq enclosed in about 100 pixels. The statistics of  $10^{10}$  events in the  $^{163}\text{Ho}$  spectrum will allow for improving the limit on  $m(\nu_e)$  by more than one order of magnitude.

In this talk, the present status of the ECHO-1k experiment will be discussed as well as the plans for the next phase, ECHO-100k.

## Co-Authors (Collaboration)

ECHO Collaboration

**Primary author:** Prof. GASTALDO, Loredana (Heidelberg University, Kirchhoff Institute for Physics)

**Presenter:** Prof. GASTALDO, Loredana (Heidelberg University, Kirchhoff Institute for Physics)

**Session Classification:** Plenary Session 8