Contribution ID: **1250** Type: **Parallel Talk**

The status of the HOLMES experiment

Thursday, 7 July 2022 18:15 (15 minutes)

Neutrino physics lies among the most obscure and fascinating sections of the Standard Model particle landscape. In particular, the measurement of their absolute mass is still an unresolved issue pursued by several experiments over the years. The state of the art concerning the model-independent ν mass hunting is KATRIN. Reaching its ultimate goal, it will push to the extreme the sensitivity limits of the spectrometric approach. An alternative for future research is the calorimetric approach. Embedding the source inside the detector, this method would avoid many systematic uncertainties due to the spectrometric configuration.

The HOLMES calorimetric experiment started in 2014 as an ERC project and is now close to starting the first data-taking period. It will set an upper limit to the ν_e mass aiming for a sensitivity of the eV order. At the same time, it will prove the calorimetric approach as a viable one for the ν_e mass direct measurement. The goal is to measure the ^{163}Ho electron capture by means of low-temperature microcalorimeters in a cryogenic set-up. Except for the neutrinos, the decay products of the ^{163}Ho nuclei are completely contained in a golden absorber. Both the EC spectrum shape and end-point would then deliver information about the escaping ν_e mass. The deposed energy is measured thanks to Mo-Cu Transition Edge Sensors (TES), which read temperature rises in the absorber as steep resistance jumps.

HOLMES is a challenging experiment that exploits advanced physics for both the detector and the read-out technique. My contribution will focus on the latest updates concerning the pre-measurement phase of the experiment. Thanks to several calibration measurements, the experimental set-up is now prepared and the data-taking process performs stably with arrays of 32 TESs. At the same time, pulse analysis routines and algorithms are ready to deal with the Holmium spectrum reconstruction. The detector fabrication has recently reached promising results that will lead the collaboration to a low-dose measurement with a few Bq of ^{163}Ho ion-implanted in each TES. During this phase, HOLMES will assess its first ν_e mass limit.

In-person participation

Yes

Primary author: ORIGO, Luca (Università degli Studi di Milano Bicocca e INFN Sezione Milano Bicocca)

Presenter: ORIGO, Luca (Università degli Studi di Milano Bicocca e INFN Sezione Milano Bicocca)

Session Classification: Neutrino Physics

Track Classification: Neutrino Physics