Poster session 1 - Monday 4 July

P1.048 **Commissioning of the KATRIN main spectrometer with an angular-selective photo-electron source**

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The KATRIN experiment will measure the mass of the electron-antineutrino with a sensitivity of 200 meV/c^2 (90% C.L.) by determining the shape of the tritium beta-spectrum in the endpoint region. This purely kinematic method allows an model-independent access to the neutrino mass. The energy analysis of the decay electrons is achieved by an electrostatic spectrometer, which follows the principle of the MAC-E filter.

The electron transmission properties of the KATRIN main spectrometer can be determined with a mono-energetic and angular-selective electron source. For this purpose, a photo-electron source has been developed at WWU Münster following the principle published in [1]. The device allows to generate electrons with well-defined energy and angle relative to the magnetic field lines by a thin photocathode layer which is illuminated by UV light. The photo-electron source has been used successfully in the commissioning of the KATRIN main spectrometer.

The energy and angular distributions which are relevant in the measurements are largely affected by the non-adiabatic electron acceleration processes inside the source. Simulations were carried out to investigate these processes and compare the simulated distributions with measurement results. The particle-tracking software “Kassiopeia” that has been developed in the KATRIN collaboration over the recent years was used for this purpose, as it allows detailed simulations of electrons in electromagnetic fields.

The poster shows the concept of the electron source and its characteristics that have been determined from measurements and simulations. Furthermore it displays results from the commissioning measurements at the KATRIN main spectrometer.

This project is supported by BMBF under contract number 05A11PM2.

[1] M. Beck et al., JINST 9 (2014) P11020


NEUTRINO 2016
SOUTH KENSINGTON, LONDON
XXVII INTERNATIONAL CONFERENCE ON NEUTRINO PHYSICS AND ASTROPHYSICS
4–9 JULY 2016