

Calibration of the high voltage and the energy scale of the KATRIN experiment

The KATRIN (KARlsruhe TRitium Neutrino-) experiment will measure the endpoint region of the tritium- β -decay spectrum to determine the neutrino mass with a sensitivity of $0.2 \text{ eV}/c^2$. To achieve this sub-eV sensitivity the energy of the decay electrons will be analyzed using a MAC-E-filter type spectrometer. The retarding potential of the MAC-E-filter of -18.6 kV has to be monitored with a precision of 60 mV (3 ppm) over a measurement period of two month.

The potential will be measured directly via two custom made precision high voltage (HV) dividers, which were developed in cooperation with the German national metrology center PTB. In order to determine the absolute values and the stability of the scale factors of the voltage dividers, regular calibration measurements with ppm precision are essential.

To guarantee a redundant monitoring system two independent HV calibration methods are used: electrical calibrations with different reference HV dividers showed sub-ppm-stability of the scale factors over the last years.

In addition to that the HV will be compared to a natural standard given by monoenergetic conversion electrons from the decay of ^{83m}Kr . This is done with three independent sources (implanted, condensed and gaseous) distributed over different locations of the experiment.

The poster will give an overview of the HV calibration of the KATRIN experiment and will show a summary of the calibration measurements over the last years as well as first results of the HV commissioning recently performed at the experiment.

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