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Measurement and modelling of the energy loss function of 18.6 keV electrons due to scattering processes in the tritium source of KATRIN

The Karlsruhe Tritium Neutrino experiment (KATRIN) is targeted to measure $m(\nu_e)$ with a sensitivity of 200 meV (90% C.L.).
To determine the neutrino mass, the integrated β-spectrum of tritium is measured close to the endpoint and a fit to the data, comprising the neutrino mass as a free parameter, is performed. A number of systematic effects need to be taken into account in the analysis. One of the major effects is the energy loss from inelastic scattering of beta-electrons with the source gas.
The corresponding energy loss function can be measured by means of an electron gun producing quasi-monoenergetic electrons at 18.6 keV with very small angular spread both in cw and pulsed mode. A new semi-empirical model has been developed based on the experimental data.
This contribution presents the new model and its impact on the KATRIN neutrino mass sensitivity.

Mini-abstract

A new semi-empirical energy loss model is presented for 18.6 keV electrons scattering off T2 at 30 K

Experiment/Collaboration

KATRIN

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