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Fitting strategies for the KATRIN neutrino mass analysis using KaFit

The KATRIN collaboration aims to determine the neutrino mass with a sensitivity of 0.2 eV (90 % CL). This will be achieved by measuring the endpoint region of the β -electron tritium spectrum. The spectrum is fit to obtain several parameters of interest, including the squared neutrino mass and the effective endpoint.

The fit is performed by combining individual tritium spectral scans, and considering systematic effects. The simplest approach, a “stacked uniform” fit, requires averaging slow control parameters, such as retarding potentials and livetime of the KATRIN detector pixels, and summing event count rates. A more sophisticated method, using “multi-fitting” which adds different likelihoods, can be done without averaging of parameters or over detector pixels, although it is more computationally expensive. The data combination and fitting methods, including systematic treatment, are compared by investigating the neutrino mass and endpoint results on Monte Carlo datasets using the KaFit software framework.

Mini-abstract

Multi-fitting with KaFit software as an improved and flexible fit method for the KATRIN experiment.

Experiment/Collaboration

KATRIN

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