

Tritium spectrum modeling for keV-sterile neutrino search with KATRIN

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The KATRIN experiment is designed to measure the effective mass of the electron anti-neutrino by studying the high-energy end of the tritium β -decay spectrum. After completing the neutrino mass campaigns, KATRIN plans to search for keV-scale sterile neutrinos. For this purpose, a novel detector system called TRISTAN is under development. The detector will consist of about 1500 Silicon Drift Detector (SDD) pixels, arranged in so-called detector modules. The SDD modules are now in production, and the commissioning of the detector is expected to begin in 2026. Thanks to the high tritium source activity of KATRIN, a statistical sensitivity at the level of $\sin^2\theta < 10^{-6}$ can be achieved. To achieve a high sensitivity, an accurate modeling of the expected spectrum accounting for all systematic effects of the experimental setup is required.

In this poster, we will present the ongoing efforts to model the expected tritium spectrum at the detector. The dominant systematic effects as well as the expected sensitivity of the KATRIN experiment to keV sterile neutrinos will be reported.

Poster prize

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