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First KATRIN results: search for light sterile neutrinos

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I will report on the light sterile neutrino search from the first four-week science run of the KATRIN experiment. Beta-decay electrons from a high-purity gaseous molecular tritium source are analyzed by a high-resolution MAC-E filter down to 40 eV below the endpoint at 18.57 keV. The analysis of the spectral shape of the spectrum near the endpoint leads to an improvement over the previous direct measurement of the neutrino mass, with a new upper limit of 1.1 eV at 90% C.L. Analyzing the shape of the whole spectrum down to 40 eV below the endpoint, we find no significant distortion compared to the standard model expectation. Therefore, exclusion bounds on the sterile mass and mixing are reported. These new limits supersede the Mainz results and improve the Troitsk bound. The reactor and gallium anomalies are further constrained.

Collaboration name

KATRIN

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