

Exploring eV-Scale Sterile Neutrinos: Insights from the KATRIN Experiment

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Sterile neutrinos, postulated as neutral leptons with no standard weak interactions, can be searched for through their mixing with active neutrinos in kinematic neutrino-mass experiments. The Karlsruhe Tritium Neutrino (KATRIN) experiment carries out precision tritium β -decay spectroscopy close to the kinematic endpoint. While the primary goal is the neutrino-mass measurement with a target sensitivity of $0.3 \text{ eV}/c^2$ (90% C.L.), we use KATRIN's data to search for light sterile neutrinos in a parameter range complementary to short-baseline neutrino oscillation experiments.

This poster presents the analysis of the five KATRIN science runs, highlighting the experiment's unique sensitivity to a fourth mass eigenstate m_4 up to 40 eV and active-to-sterile mixing amplitude of $|U_{e4}|^2 \leq 0.5$. Ongoing enhancements in statistics, background reduction and systematic uncertainty control expand coverage over relevant short-baseline oscillation anomaly regions.

Poster prize

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