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keV sterile neutrinos search with the KATRIN experiment

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The KATRIN experiment is designed to measure the mass of the electron anti-neutrino by studying the high energy end of the tritium β decay spectrum. In addition, KATRIN is also a well suited instrument to explore the sterile neutrino hypothesis. The existence of sterile neutrinos would cause a kink-like distortion in the spectrum.

Using the same datasets as for active neutrino mass, KATRIN has previously presented results on the search for sterile neutrinos at the eV scale, complementing the reactor and radioactive source experiments. With an endpoint of 18.6 keV, KATRIN also offers a high potential for the search of sterile neutrinos in the keV range. With data acquired during the 2018 commissioning campaign, KATRIN reported results from a search for keV-scale neutrinos in the restricted mass range of 0.01 to 1.6 keV. No keV-sterile neutrino signal was observed and KATRIN reported exclusion limits competitive with other laboratory-based searches. The current KATRIN detector is not designed to handle the higher count rate that occurs with a wider mass range. Equipped with the TRISTAN detector KATRIN aims to search for keV sterile neutrinos across the full tritium beta decay spectrum. This detector is currently in production and is scheduled to be operational in KATRIN in 2026.

In this talk, I will present the latest results from KATRIN on the search for keV sterile neutrinos, as well as the ongoing efforts to conduct a high sensitive search with the TRISTAN detector.

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