Contribution ID: **1248** Type: **Poster**

Sensitivity studies for a next-generation neutrino-mass experiment using tritium β-decay

Friday, 19 July 2024 20:40 (20 minutes)

The Karlsruhe Tritium Neutrino (KATRIN) experiment probes the absolute neutrino mass scale by precision spectroscopy of the tritium β-decay spectrum. By 2025, a final sensitivity better than 0.3 $\mathrm{eV/c^2}$ (90% C.L.) is anticipated with a total of 1000 days of measurement.

Going beyond this goal, for instance towards the regime of inverted mass ordering, requires novel technological approaches to significantly improve statistics, energy resolution, and background suppression. In this work, we explore two key strategies: (1) implementing a differential detector technique with sub-eV energy resolution (quantum sensor detector array, time-of-flight) and (2) exploring a large-volume atomic tritium source. This allows for high statistics to be acquired more quickly and with ultra-high energy resolution. In this poster presentation, we investigate the limits by physics and requirements by technology to confine achievable sensitivities on neutrino mass with a differential measurement.

Alternate track

I read the instructions above

Yes

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Session Classification: Poster Session 2

Track Classification: 02. Neutrino Physics