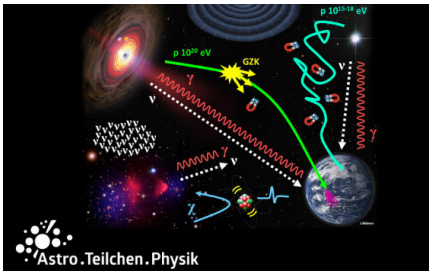

Contribution ID: **97** Type: **Poster**

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

Wednesday, October 16, 2024 5:59 PM (2 minutes)

The Karlsruhe Tritium Neutrino (KATRIN) experiment probes the absolute neutrino mass scale by precision spectroscopy of the tritium β-decay spectrum. With the data taken by the end of 2025, a final sensitivity better than 300 meV/c^2 (90\% C.L.) is anticipated by the collaboration with a total of 1000 days of measurement.

Taking the next steps in enhancing the sensitivity, for instance towards the regime of inverted mass ordering, requires a paradigm shift and 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 measurement) to resolve each electron's energy individually while covering the entire energy interval of interest simultaneously and (2) exploring a large-volume atomic tritium source. These modifications would allow for high statistics to be acquired more quickly and with ultra-high energy resolution. In this poster presentation, we introduce the conceptual framework for simulations to investigate the requirements by technology and limits by physics to confine the achievable sensitivity on the neutrino mass with a differential measurement.

Summary

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Session Classification: Poster session leading into social dinner buffet