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A Look at General Neutrino Interactions with KATRIN Data

Saturday, November 26, 2022 4:00 PM (2 hours)

The KATRIN experiment aims to measure the neutrino mass by precision spectroscopy of tritium β -decay. Recently, KATRIN has improved the upper bound on the effective electron-neutrino mass to $0.8 \text{ eV}/c^2$ at 90% confidence level [1] and is continuing to take data for a target sensitivity of $0.2 \text{ eV}/c^2$.

In addition to the search for the neutrino mass, the ultra-precise measurement of the β -spectrum can be used to probe physics beyond the Standard Model. In particular, general neutrino interactions (GNI) [2] can be investigated through a search for potential shape variations of the β -spectrum. For this purpose, all theoretically allowed interaction terms for neutrinos are combined in one effective field theory. This enables a model-independent description of novel interactions, which could provide small contributions to the weak interaction. Such potential modifications can then be identified in the KATRIN β -spectrum by means of energy-dependent contributions to the rate.

The poster will introduce the theoretical background of the general neutrino interactions, give an overview of the analysis method and present first sensitivity studies.

[1] The KATRIN Collaboration. Direct neutrino-mass measurement with sub-electronvolt sensitivity. *Nature Physics* 18, 160–166, 2022.

[2] Ingolf Bischer and Werner Rodejohann. General neutrino interactions from an effective field theory perspective. *Nuclear Physics B*, 947, 2019.

Category

Particle / Astroparticle / Cosmology (Experiment)

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