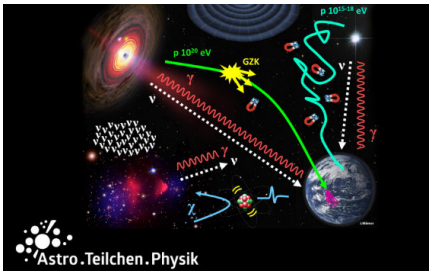

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R&D towards an atomic hydrogen source for future neutrino mass experiments

Wednesday, October 16, 2024 5:31 PM (2 minutes)

The neutrino mass is one of the still-to-be-solved puzzles of particle physics. Measuring the neutrino mass is possible by performing precision spectroscopy of the tritium beta-decay spectrum at its endpoint. Until now, experiments following this approach use molecular tritium and are therefore limited by the broadening of the molecular final state distribution.

For future experiments aiming for sensitivities as low as the lower boundaries obtained by neutrino oscillation experiments ($0.05\,eV/c^2$ in case of inverted ordering, or $0.009\,eV/c^2$ for normal ordering), atomic tritium sources are essential.

Research on atomic tritium sources is performed at the Johannes Gutenberg University (JGU) in Mainz in the context of the Project 8 experiment and at the Tritium Laboratory Karlsruhe (TLK) of the Karlsruhe Institute of Technology (KIT) in the context of the KATRIN++ program.

Currently, the focus of the JGU group is on developing and characterizing a high-flow atomic source using inactive hydrogen, whereas the focus of the TLK group is on operating a source with tritium for the first time. Subsequently, in a joint venture, these lines of research will be merged to create the Karlsruhe Mainz Atomic Tritium experiment (KAMATE).

The poster will present the current developments for atomic sources at JGU and KIT, and how we combine them into a joint effort to realize an atomic tritium source for future neutrino mass experiments.

Summary

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Session Classification: Poster session leading into social dinner buffet