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First tritium spectrum recorded with Cyclotron Radiation Emission Spectroscopy (CRES)

The Project 8 collaboration aims for a direct measurement of the absolute neutrino mass scale from the distortion of the tritium beta decay spectrum near the endpoint. To this end, the collaboration has successfully established CRES, a frequency-based approach to detect electrons and determine their kinetic energy. In this contribution we present the first tritium spectrum recorded using the CRES technique. The data were accumulated over a duration of 3 months. It shows no events beyond the endpoint, demonstrating the ultra-low background obtainable with this technology. We further analyze the influence of the main systematic error sources, including energy resolution and detection efficiency, on the shape of the recorded spectrum and the endpoint determination. This work is supported by the US DOE Office of Nuclear Physics, the US NSF, the PRISMA+ Cluster of Excellence at the University of Mainz, and internal investments at all institutions.

Mini-abstract

The Project 8 collaboration has recorded its first tritium spectrum using the CRES technique.

Experiment/Collaboration

Project 8

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