

Sensitivity analysis for the neutrino mass experiment Project 8

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The most successful method of probing neutrino mass directly is beta decay spectroscopy. The Project 8 experiment is pursuing a next-generation direct neutrino mass measurement with a target sensitivity of $40\text{meV}/c^2$. To this end, the collaboration has developed the technique of Cyclotron Radiation Emission Spectroscopy (CRES), a frequency-based approach for measuring differential beta decay spectra. We employ an analytic model of neutrino mass uncertainty to predict the sensitivity of differential tritium decay measurements. Specifically, we implement features of CRES signal detection and systematic effects of a resonant cavity CRES experiment as is planned by the Project 8 collaboration. Based on this model, we optimize design parameters and discuss the experimental requirements for the final phase of Project 8. We also address the experimental needs for the upcoming phase, which seeks to achieve sub-eV sensitivity.

Poster prize

Yes

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Project 8

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