

Project 8: Towards a Radio Frequency Measurement of the Neutrino Mass

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Project 8 aims to determine the neutrino mass from the beta-decay of tritium ($Q = 18.6$ keV).

Since the cyclotron frequency of a charged particle traveling in a homogeneous magnetic field is inversely proportional to its total energy, a measurement of this frequency provides accurate knowledge of the particle's total energy. This allows the reconstruction of the electron energy spectrum from a frequency measurement. We intend to detect the cyclotron radiation of single electrons emitted in the beta-decay. Important advantages of this novel approach are superior energy resolution and scalability.

In the current phase the collaboration aims to demonstrate the feasibility to detect the cyclotron radiation emitted from single mono-energetic electrons ($E_{e,1} = 17.8$ keV and $E_{e,2} = 30.2$ keV) released in the decay of $^{83\text{m}}\text{Kr}$ in a 1 T magnetic field. We will discuss the progress in commissioning the new prototype experiment, signal detection techniques and signal analysis.

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