

LNGS SEMINAR SERIES

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Project 8: Measuring Neutrino Mass Using Radio-Frequency Techniques

The shape of the beta decay energy distribution is sensitive to the mass of the electron neutrino. Attempts to measure the endpoint shape of tritium decay have so far seen no distortion from the zero-mass form, thus placing an upper limit. Here we show that a new type of electron energy spectroscopy could improve future measurements of this spectrum and therefore of the neutrino mass. We propose to detect the coherent cyclotron radiation emitted by an energetic electron in a magnetic field. For mildly relativistic electrons, like those in tritium decay, the relativistic shift of the cyclotron frequency allows us to extract the electron energy from the emitted radiation. As the technique inherently involves the measurement of a frequency in a non-destructive manner, it can achieve a high degree of precision. In this talk, we present the status of the first prototype and discuss the long-term plans of the experimental program.

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