

Project 8: Using Radio Frequency Techniques to Measure the Neutrino Mass from Beta Decay

We propose a novel technique by which the energy spectrum of low energy electrons can be extracted. The technique relies on the detection and measurement of coherent radiation created from the cyclotron motion of electrons in strong magnetic fields. Since the frequency of cyclotron radiation emitted by the particle depends inversely on its Lorentz boost, the detection and measurement of the coherent radiation emitted is tantamount to measuring the kinetic energy of the electron. As the technique inherently involves the measurement of a frequency in a non-destructive manner, it can, in principle, achieve a high degree of resolution and accuracy. One immediate realization of this technique is in the measurement of the endpoint spectrum from tritium beta decay, which is directly sensitive to the absolute mass scale of neutrinos. In this poster, we discuss a new experimental effort, known as Project 8, to utilize this technique towards a sensitive beta decay neutrino mass experiment.

Summary

A new experimental effort, known as Project 8, utilized radio-frequency techniques to perform spectroscopy on electrons created from tritium beta decay. The technique is to be used for a future measurement of the mass of the electron neutrino from beta decay.

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