

Abstract Submitted
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Time-domain Simulation of RF Antenna Response in the Project 8 Experiment ARINA TELLES, Yale University, PROJECT 8 COLLABORATION — The Project 8 experiment aims to directly measure the neutrino mass down to ~ 40 meV/ c^2 by reconstructing the kinematics of tritium beta decay, using a novel technique called cyclotron radiation emission spectroscopy (CRES). In this method, the electron source is placed in a uniform 1 T magnetic field and its cyclotron frequency is used to infer its kinetic energy. The distortion at the endpoint of its energy spectrum then constrains the effective neutrino mass. This technique has been demonstrated on a small scale in waveguides to detect radiation from single electrons. The next phase of the experiment (Phase III) will move to larger volume to increase sensitivity, requiring implementation of CRES in a free-space radiation environment. Feasibility will require detection of a 1 fW signal near 26 GHz. Accurate simulations are necessary to model the reception and transmission of this faint signal and to test electron energy reconstruction. In this talk we will describe time-domain modeling of microstrip antennas for the Phase III detector. A selection of antenna responses from the Locust simulation software are compared with results from commercial high-frequency simulations (ANSYS HFSS), and are applied toward CRES electron simulations.

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