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P1.056 Results from the Project 8 Phase-1 cyclotron radiation emission spectroscopy detector

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The Project 8 collaboration seeks to measure the absolute neutrino mass scale by means of precision spectroscopy of the beta decay of tritium. Our technique, Cyclotron Radiation Emission Spectroscopy, measures the frequency of the radiation emitted by electrons produced by decays in an ambient magnetic field. Because the cyclotron frequency is inversely proportional to the electron's Lorentz factor, this is also a measurement of the electron's energy. In order to demonstrate the viability of this technique, we have assembled and successfully operated a prototype system, which uses a rectangular waveguide to collect the cyclotron radiation from internal conversion electrons emitted from a gaseous krypton-83m source. Here we present the main design aspects of the first phase prototype, which was operated during parts of 2014 and 2015. We will also discuss the procedures used to analyse these data, along with the features which have been observed and the performance achieved to date.