

Abstract Submitted
for the APR20 Meeting of
The American Physical Society

Project 8: Measuring the Neutrino Mass using Cyclotron Radiation Emission Spectroscopy¹ LUIZ DE VIVEIROS, Pennsylvania State University, PROJECT 8 COLLABORATION — Project 8 is an experiment that seeks to determine the mass of the electron neutrino via the precise measurement of the electron energy in beta decays, with a goal sensitivity of 40 meV/c². We have developed a novel technique called Cyclotron Radiation Emission Spectroscopy (CRES), which allows single electron detection and characterization through the measurement of cyclotron radiation emitted by magnetically-trapped electrons produced by a gaseous radioactive source. The technique has been successfully demonstrated on a small scale in waveguides to detect radiation from single electrons, and to measure the continuous spectrum from tritium. The next phase of the experiment will move to larger volumes to increase sensitivity, requiring implementation of CRES in a free-space radiation environment instrumented with a phased antenna array. We present a brief overview of the Project 8 experimental program, highlighting the preliminary measurement of the tritium beta spectrum using CRES in a small scale prototype, and the development of the techniques needed to deploy CRES at large scales.

¹This work is supported by the US DOE Office of Nuclear Physics, the US NSF, the PRISMA+ Cluster of Excellence at the University of Mainz, and internal investments at all institutions.

Luiz de Viveiros
Pennsylvania State University

Date submitted: 09 Jan 2020

Electronic form version 1.4