Abstract Submitted
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An Experiment for the Precision Measurement of the Radiative Beta Decay Mode of the Free Neutron R.L. COOPER, T.E. CHUPP, U Michigan, K.J. COAKLEY, M.S. DEWEY, B.M. FISHER, T.R. GENTILE, J.S. NICO, A.K. THOMPSON, NIST, F.E. WIETFELDT, Tulane U, E.J. BEISE, H. BREUER, H.P. MUMM, U Maryland, J. BYRNE, U Sussex — We have completed a measurement of the neutron radiative beta-decay branching ratio to 10% relative standard uncertainty (15-340 keV photons). The goal of the next generation experiment is to perform a precision measurement of the branching ratio and the photon energy spectrum to a few percent. To reduce the statistical and systematic uncertainties, a 12-element detector is being developed to operate in the bore of a superconducting magnet. It consists of 12 inorganic, scintillating crystals coupled to avalanche photodiodes. Results from tests of the detector's operation and response using a small dewar and external gamma-ray sources will be presented. Monte Carlo modeling of the detector response is necessary to extract the photon energy spectrum and understand systematic effects. We also present a method to examine the consistency of the electron-proton coincidence rate with known properties of neutron beta decay. By improving calibrations and benchmarks, this experiment can better utilize the expected increase in detected events to make an accurate measurement of the branching ratio and photon energy spectrum.

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