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Precision Measurement of the Radiative Decay Mode of the Neutron BENJAMIN O'NEILL, Arizona State University, RDK II COLLABORATION — The theory of quantum electrodynamics predicts that beta decay of the neutron into a proton, electron, and antineutrino should be accompanied by a continuous spectrum of photons. We previously reported detection of photons from neutron beta decay with a branching ratio of (3.13+/- 0.34) $\times$ 10^{-3} in the energy range of 15 keV to 340 keV. This was achieved by prompt coincident detection of an electron and photon, in delayed coincidence with a proton. The photons were detected using a single bar of bismuth germanate scintillating crystal coupled to an avalanche photodiode (APD). Our current experiment employs an array of twelve of these detectors, as well as three large area APD detectors. We anticipate that our improved measurement of the branching ratio will have an uncertainty of 1 percent. In addition, the large area APDs allow extension of the detectable energy range to $\approx$0.5 keV. We will present details of the apparatus and a discussion of the status of the analysis of the branching ratio and the photon energy spectrum.

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