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Simulations for a Precision Measurement of the Radiative Decay Mode of the Neutron MATTHEW BALES, University of Michigan, RDK-II COLLABORATION COLLABORATION — An experiment is underway to measure the branching ratio (BR) and energy spectrum of the radiative decay mode for the free neutron in the 10 keV to 340 keV range with an anticipated uncertainty of 1% for the BR. The measurement is performed by correlating the detection of the proton, electron, and photon from the beta decay of a cold neutron beam. The beam travels through magnetic and electric fields which transport the charged decay particles to a surface barrier detector located off axis of the beam. Photons are registered by two detectors: an annular array of twelve bismuth germanate crystals coupled to avalanche photodiodes and a separate detector consisting of three bare avalanche photodiodes. The latter will allow extension of the detected photon energy range down to approx. 0.5 keV. Due to the complex nature of the geometry, fields, and materials in the experiment, it is necessary to employ computer simulation to extract the BR. These techniques include event generation, charged particle transport, and detector simulation. By comparing the simulation to measured parameters (such as rates, energy spectra, and time-of-flight), we can verify that the simulations correctly model the physics of the experiment. We present details of the simulation methods and the results as they relate to the data analysis.

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