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Validity Of the Low Energy Electromagnetic Physics As Implemented Using the Geant4 Toolkit Using A Sr^{90}/Y^{90}Beta Emitter Source
RACHEL BLACK, PAUL GUEYE, Hampton University — Calibration procedures in experimental physics (nuclear physics, material sciences, medical physics etc.) usually require the use of a low activity radioactive source. A model of the setup is most often performed to understand and optimize system performances. We have investigated the validity of the low energy electromagnetic physics models up to a 2.3 MeV as implemented in the Geant4 simulation toolkit. For this, a set of experiments was done using a beta emitter source consisting of a Sr^{90}/Y^{90} in secular equilibrium. The electrons enter a permanent dipole magnet made of two 5.08x5.08x2.54 cm^3 blocks of Neodymium Iron Boron encased within an iron support frame and separated by a distance of 2cm. The measured Gaussian-like magnetic field separates the energies of the beta particles exiting the magnet. These electrons were then collected on an array made from sixteen 1mm thick scintillating fibers. The experimental data were compared against the ICRU database. The Geant4 simulation was developed to understand the energy loss and spectra obtained during the actual experiment. Forward (backward) simulation were done to generate (reconstruct) the (secondary) primary energy distribution of the source. Preliminary results of this study will be discussed.

Rachel Black
Hampton University

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