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Comparison of GEANT4 Physics Models with Measured Beta Particle Data in Aluminum using a Strontium-90 Source SAMANTHA EVERETT, Texas Southern University — A transmission curve experiment was carried out to measure the range of beta particles in aluminum in the health physics laboratory located on the campus of Texas Southern University. The transmission count rate through aluminum for varying radiation lengths was measured using beta particles emitted from a low activity ($\sim$1 μCi) Sr-90 source. The count rate intensity was recorded using a Geiger Mueller tube (SGC N210/BNC) with an active volume of 61 cm^3 within a systematic detection accuracy of a few percent. We compared these data with a realistic simulation of the experimental setup using the Geant4 Monte Carlo toolkit (version 9.3). The purpose of this study was to benchmark our Monte Carlo for future experiments as part of a more comprehensive research program. Transmission curves were simulated based on the standard and low-energy electromagnetic physics models, and using the radioactive decay module for the electrons primary energy distribution. To ensure the validity of our measurements, linear extrapolation techniques were employed to determine the in-medium beta particle range from the measured data and was found to be 1.87 g/cm^2 ($\sim$0.693 cm), in agreement with literature values. We found that the general shape of the measured data and simulated curves were comparable; however, a discrepancy in the relative count rates was observed. The origin of this disagreement is still under investigation.

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