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Monte Carlo Simulation of a Geiger Counter, Gamma-Ray Sources and Shielding

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Geiger counters are extensively utilized for measuring ionization radiation from alpha-particle, beta-particle, and gamma-ray sources. Geiger counters are used for radiation monitoring and field characterization in areas such as radiological protection, experimental physics, and nuclear industry. In this study, Monte Carlo simulations of a Geiger counter were completed using a Monte Carlo N-Particle Transport Code (MCNP). The purpose of this study was to expand the Geiger counter model to include gamma-ray shielding. To verify the code effectiveness, different simulations have been conducted using a variety of radiation sources (e.g., Cs-137 and Co-60) and materials including iron, lead, and concrete. The results are compared to the accepted general mathematical models for gamma ray shielding.