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Geant4 simulation of the attenuation properties of plastic shields for beta radionuclides employed in internal radiotherapy

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We developed a simulation in Geant4 to compare the attenuation properties and the bremsstrahlung radiation yield of different types of plastic materials employed as shield of beta radioactive sources. Code validation results against Sandia and NIST data are presented. We discuss the influence of cuts in range, step limits and multiple scattering step limitations, for the three physics packages available.

For polypropylene, polystyrene, polyamide nylon-6, poly-methyl methacrylate, polycarbonate, polyethylene terephthalate, polyvinyl chloride and polytetrafluoroethylene we evaluated the mean and maximum ranges for electrons originating from ^{90}Sr and ^{90}Y , as well as the number and the spectrum of the bremsstrahlung X-rays produced. Significant differences appear between the various materials, and the choice of the best one depends also on the physical properties requested for each specific application.

Are you a Member of the Geant4 Collaboration (yes/no)

no

Keywords

beta radionuclides, plastic shields, range electrons

Summary

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