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# Optimization study of a muon tomography system for imaging of nuclear waste containers

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The important parameters of nuclear waste have to be determined for its classification and selection of optimal disposal option. For the non-destructive characterization of nuclear waste muon scattering tomography techniques can be used to image the contents of an enclosed volume by measuring the scattering angle of cosmic ray muons as they pass through a nuclear waste container using particle tracking detectors. In this paper we present an optimization study of a muon tomography detector to obtain its parameters for best performance. Using Geant4 combined with Cosmic-ray shower generator (CRY) we have studied two detector geometries to compare their efficiency of detection and reconstruction of high-Z materials. One of detector design consist of muon two tracking detectors placed on top and bottom sides of nuclear waste container and another one represents closed up design when muon trackers are surrounding container from four sides. The results of POCA reconstruction of 10 cm cubic size object of high-Z material encapsulated in a concrete matrix indicate that detector design with tracking detectors on four sides around container demonstrate slightly better performance comparing to detector design with two tracking detectors on top and bottom. On the other hand, tomography system with muon trackers on top and bottom sides can be more universal allowing changing the distance between planes and measuring nonstandard nuclear waste.

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