

Investigation of deflection angle for muon energy classification in muon scattering tomography via GEANT4 simulations

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In muon scattering tomography, the investigated materials are discriminated according to the scattering angle that mainly depends on the atomic number, the density, and the thickness of the medium at a given energy value. The scattering angles at different initial energies also provide the opportunity to classify the incoming muons into a number of energy groups. In this study, by employing the GEANT4 code, we show that the deflection angle exponentially decays with respect to the energy increase, and the numerical values for the current configuration are below the detector accuracy except the initial energy bins owing to the low-Z, low density, and low thickness of the current plastic scintillators. This implies the necessity of additional components that provoke the muon scattering. Therefore, we introduce stainless steel surfaces into the top and bottom sections in order to amplify the deflection angle as well as to reduce the uncertainty, thereby improving the detector performance.

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Authors: TOPUZ, Ahmet Ilker (Catholic University of Louvain); Prof. KIISK, Madis (University of Tartu); GI-AMMANCO, Andrea (Universite Catholique de Louvain (UCL) (BE))

Presenter: TOPUZ, Ahmet Ilker (Catholic University of Louvain)

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