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Simulation-Based Analysis of Cosmic Muon Flux in Tunnels at EJUST

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Cosmic Ray Muons are highly energetic and can be used in different applications such as muography to detect voids and cracks within underground structures. In this work, PHITS based Analytical Radiation Model in the Atmosphere (PARMA) is used to generate cosmic ray muons at Egypt-Japan University for Science and Technology (E-JUST) location. The tracks of these muons through the layers of concrete in the building are simulated with PHITS (Particle and Heavy Ion Transport code System) to calculate the energy of the muons that reach the tunnel in E-JUST, where we will place the scintillator detector.

The flux of cosmic ray Muons is approximately $160 \text{ muons s}^{-1} \cdot \text{m}^{-2}$ at sea level. However, this flux decreases by decreasing the altitude. This factor should be considered when simulating the muons for experiments held underground.

The interaction of muons with building materials, materials' thickness, and the altitude with respect to the sea level are considered as well. The particles tracks, the flux and the energy spectrum of the attenuated muons are also presented.

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