

FLUKA/GEANT4 Comparisons: Progress and Differences

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Owing to its depth underground, SNOLAB is an excellent site for hosting rare event searches such as searches for WIMP-like dark matter or neutrinoless double beta decay. The overburden of rock at SNOLAB provides a reduction in the cosmic muon flux of over 7 orders of magnitude as compared to the flux at sea level. Still, even the residual fluxes of cosmic muons can contribute to backgrounds; either themselves or by producing secondaries locally.

Adequate background models for such rare event experiments include calculations—typically via Monte Carlo simulations—of these would-be steady-state backgrounds. Common simulation toolkits like GEANT4 and FLUKA are deployed to transport the virtual particles through detector configurations wherein they randomly interact according to various material cross sections (to the extent which they are known). Often, those tasked with performing virtual measurements with simulations will compare results between the canonized FLUKA and GEANT4 as a test for convergence. Without delving into the underlying mechanics of the simulations with any profundity, I will discuss the effort within one such rare event search, nEXO to quantify cosmogenic activation using both GEANT4 and FLUKA

Presenter: ROSS, Regan (McGill University)

Session Classification: New Opportunities and Directions