



Contribution ID: 14

Type: Nuclear and Particle Physics

MUTE: A Modern Calculation of Deep Underground and Underwater Cosmic Ray Muons

Tuesday, February 15, 2022 1:36 PM (12 minutes)

I present a new, open-source program, MUTE (MUon inTensity codE), which propagates cosmic ray muons from the atmosphere to laboratories deep underground and underwater using the most recent state-of-the-art computational tools. The evolution of cosmic rays in the Earth's atmosphere is computed with MCEq (Matrix Cascade Equation), using the latest theoretical primary and hadronic interaction models in order to calculate the muon flux at the surface. This flux serves as an input to the Monte Carlo code PROPOSAL (PRopagator with Optimal Precision and Optimised Speed for All Leptons) to propagate the muons through matter. A forward-prediction for muon spectra at different slant depths is calculated with the highest precision to date. The results, which have been submitted to The Astrophysical Journal (<https://arxiv.org/abs/2109.11559>), are compared to vertical muon intensity data from various sites underground and underwater. The implications of the results as well as the seasonal variation of the muon flux and the total flux under both flat and non-flat overburdens will also be discussed.

email address

wwoodley@ualberta.ca

Please select: Experiment or Theory

Theory

Primary author: WOODLEY, William (University of Alberta)

Co-authors: PIRO, Marie Cecile (University of Alberta); Dr FEDYNITCH, Anatoli (Academia Sinica)

Presenter: WOODLEY, William (University of Alberta)

Session Classification: Particle Physics