Propagating Neutrinos and Charged Leptons Inside the Earth using nuPyProp[1] SAMEER PATEL, University of Iowa, NUSPACESIM COLLABORATION — The design and development of new balloon and sub-orbital missions capable of detecting upward going extensive air showers caused by neutrino interactions inside the Earth rely on simulations to assess instrument sensitivity to UHE neutrinos. We introduce nuPyProp, which is a simple to use, Monte Carlo package designed to simulate and model UHE neutrino interactions and charged lepton energy loss inside the Earth. nuPyProp is a part of the nuSpaceSim simulation package, and it primarily generates lookup tables for $\nu_\tau \to \tau$ and $\nu_\mu \to \mu$ propagation. It allows for the user to choose from a subset of neutrino cross-section models and charged lepton photonuclear energy loss models, along with the flexibility to create & use custom models for propagation. I will describe the simulation framework and discuss the impacts of using different models and two different energy loss propagation techniques - stochastic & continuous on charged lepton exit probabilities and their outgoing energy distributions.

Sameer Patel
University of Iowa

Date submitted: 25 Oct 2021   Electronic form version 1.4