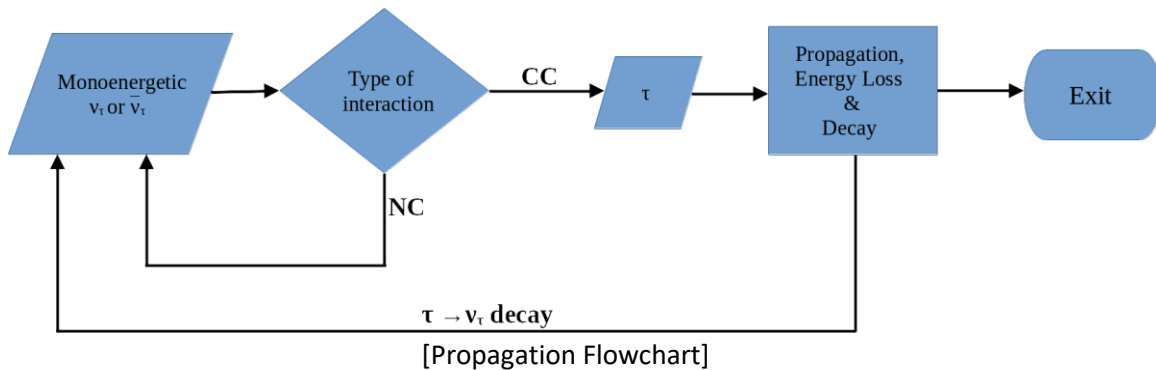# Monte Carlo Simulations with nuPyProp

(Sameer Patel, Contribution #482)

## Overview

Monte Carlo code package that models ν_τ/ν_μ flux attenuation & distribution of τ/μ in the Earth. It is part of the vSpaceSim package. The code is capable of propagating $\nu_\tau \to \tau$ as well as $\nu_\mu \to \mu$, with two electromagnetic energy loss mechanisms – stochastic and continuous.

[Propagation Flowchart]

Features

- Highly modular; written in Python + Fortran; no fancy modules required.
- Includes several theoretical models with templates for custom, user-defined models.
- Model lookup tables generated before (propagation) runtime, improving overall code speed.
- All in one HDF5 data lookup and output tables, eliminating the need for multiple output files.

Results
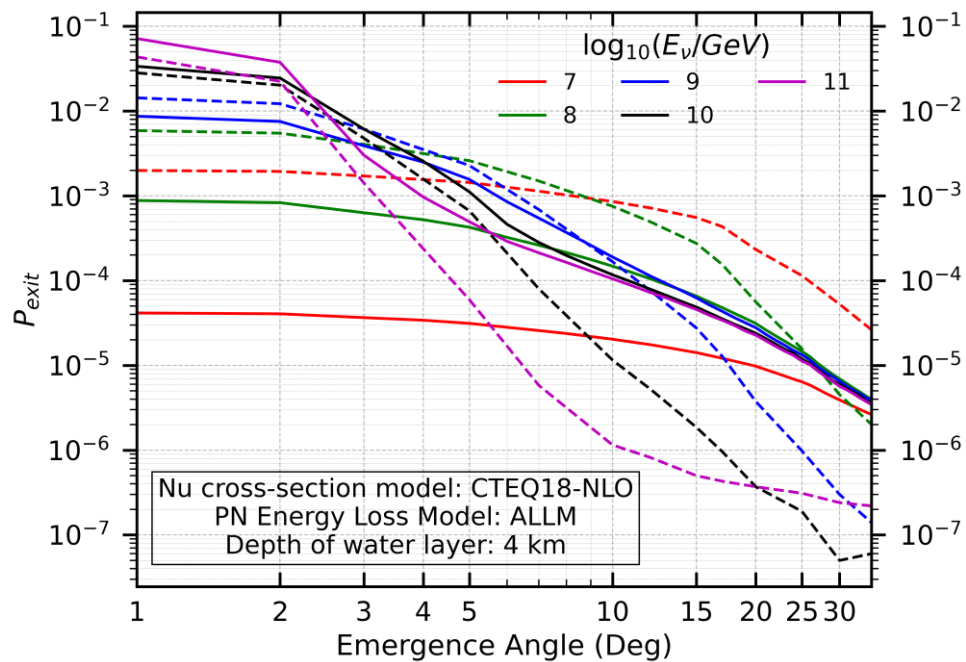
[Exit Probabilities for $\nu_\tau \to \tau$ (solid) & $\nu_\mu \to \mu$ (dashed)]