Atmospheric Neutrinos Sim/Reco Needs

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1) Simulations

- GENIE

  - Maintenance: Flux drivers routinely change over time (+/-), better validation needed.

  - Improvements: production height information, upward stopping muon simulation, better method for generating atmos events.

2) Analysis Tools

- Generator level - exposure calculators

- Physics analyses: 3-flavor oscillations including matter effects in earth, extension to BSM scenarios will require work in some cases.

3) Reconstruction

- Most studies have focussed on atmospherics as background

- A dedicated atmospheric neutrino reconstruction does not exist.

- Neutrino direction reconstruction particularly challenging.

Talks at this meeting (K. Mason, J. Mills):   https://indico.fnal.gov/event/15181/session/2/contribution/9/material/slides/0.pdf
https://indico.fnal.gov/event/15181/session/2/contribution/8/material/slides/0.pdf