HNL studies with GENIE

Validation study

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12 / 11 / 2020

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Introduction :

- HNL flux production is done following Silvia's et Al method. Eg Scaling SM neutrino fluxes by a kinematic factor to get the expected HNL fluxes.

- Most up to date geometry used.

- Using MPD only geometry for the moment.

- Studying : HNL > u pi channel to validate GENIE

- Test done with HNL mass =300 MeV with only muon coupling.

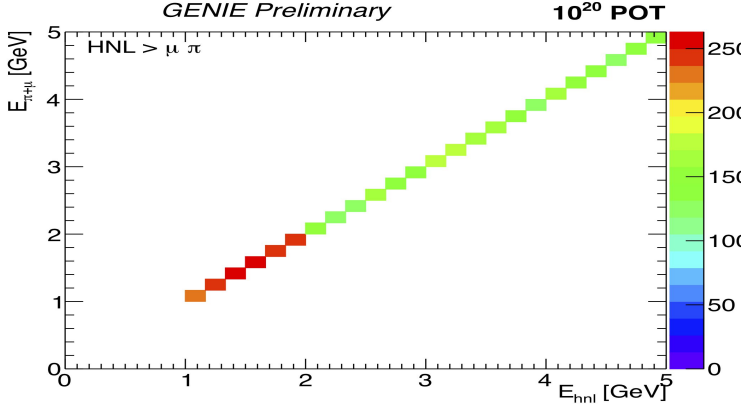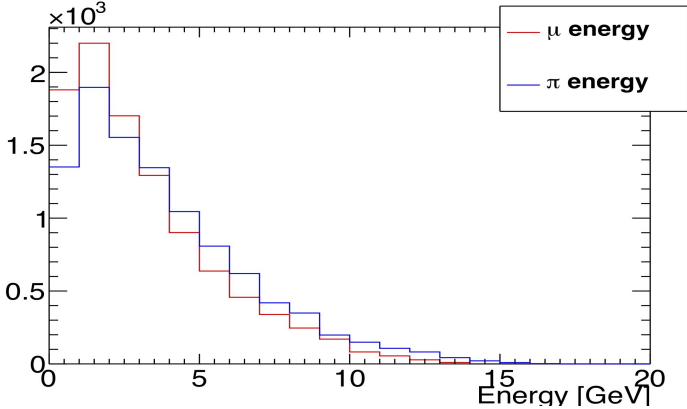- All other samples are available and ready to be used for simulation study.
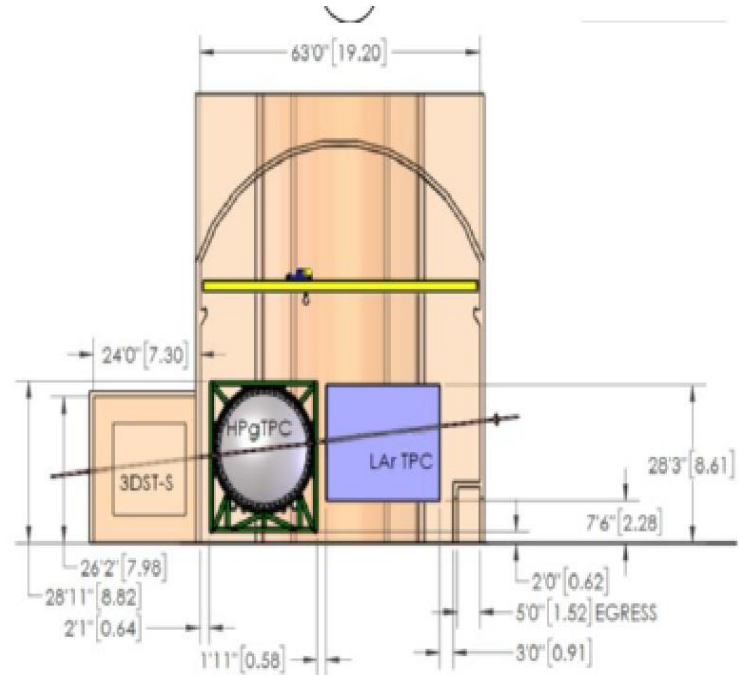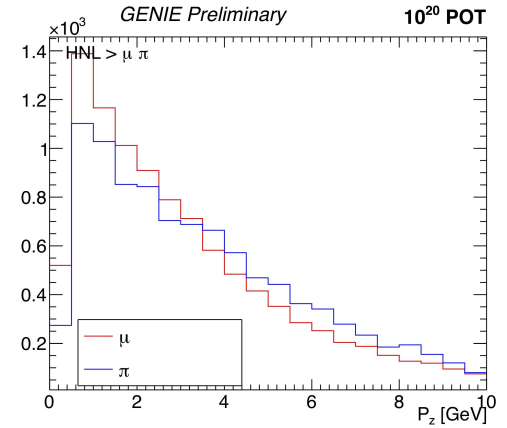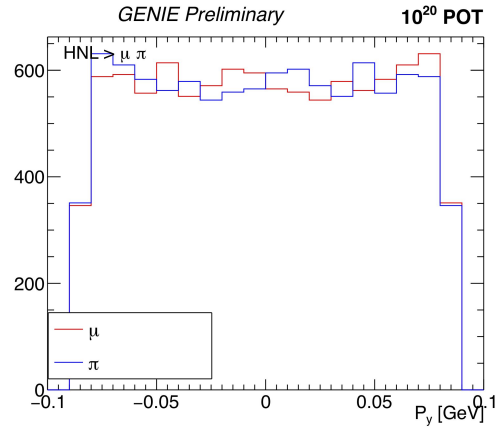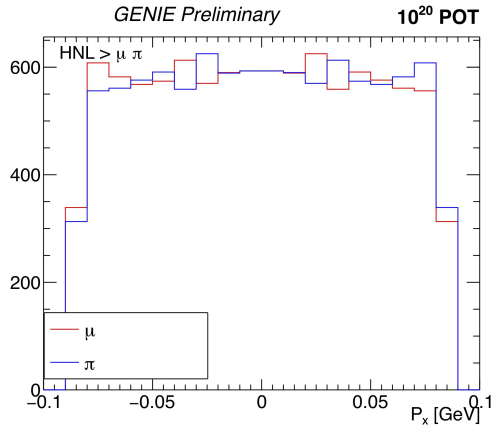
HNL energy :
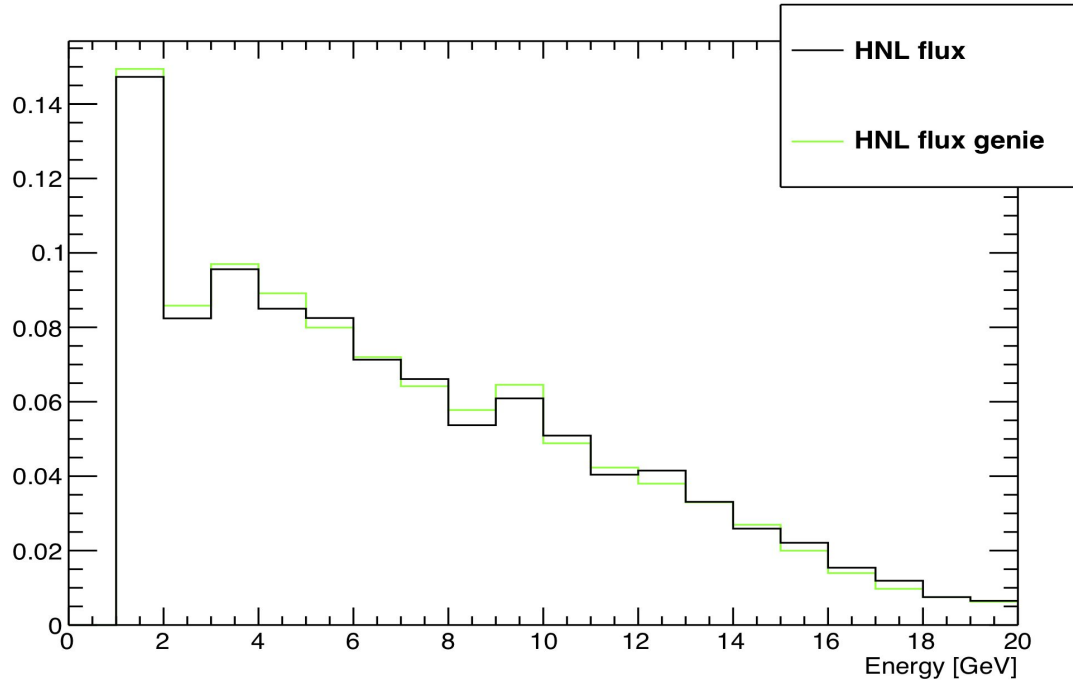
- All looks fine - If we produce a very big amount of HNL decay using GENIE. We will get the same distribution.

Energy spectrum
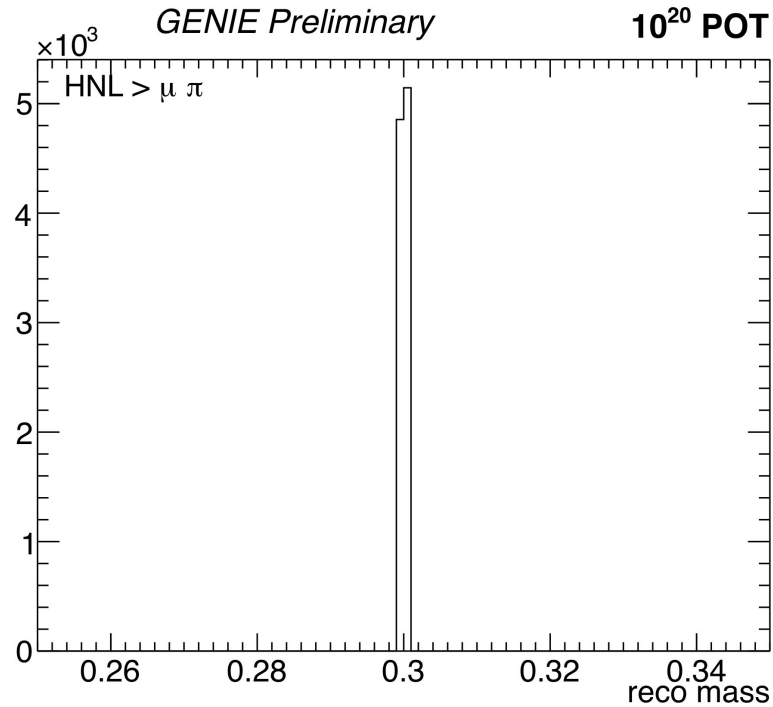
- Sanity checks : The energy is well conserved.
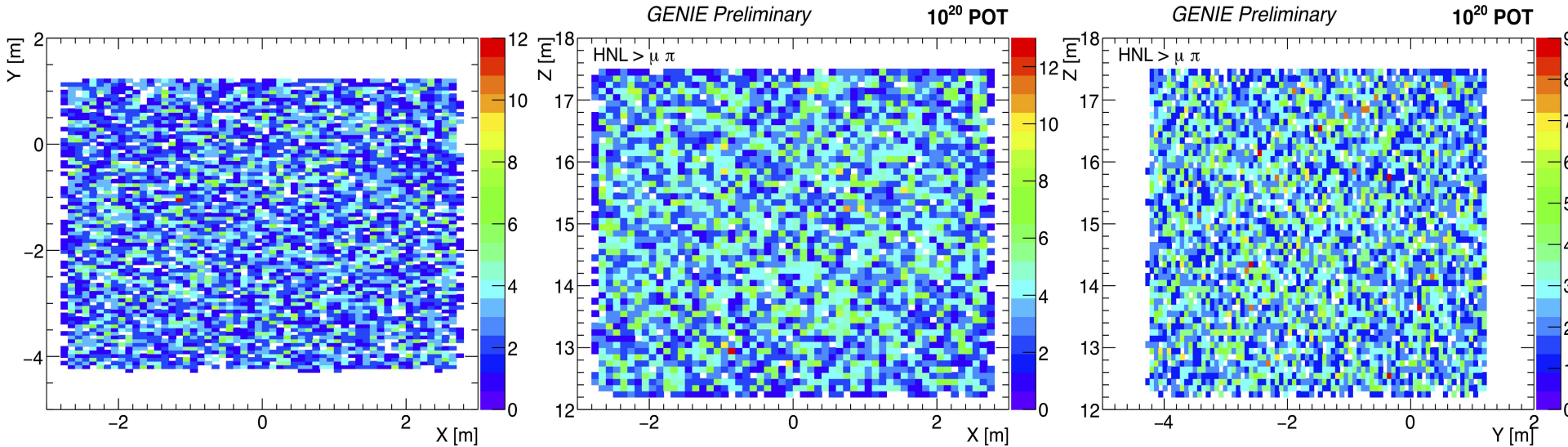
Daughters momentums :

- All is fine.

Reconstruction of HNL mass :

- HNL mass is 300 MeV ⇒ All is fine

GENIE Preliminary 10^{20} POT

HNL > μ π

reco mass

2D vertex position

- Well randomly distributed.
- We approximate the vertex generation with a rectangle, instead of a cylinder. A very minor effect - will be changed in the future.

Summary :

- Validation of GENIE is in place.

- Files are ready. HNL production - decay to different channels.

- Next step : Proceed with the simulation - reconstruction tools.

Back up :