



DUNE Beam Interface Working Group

To-do list

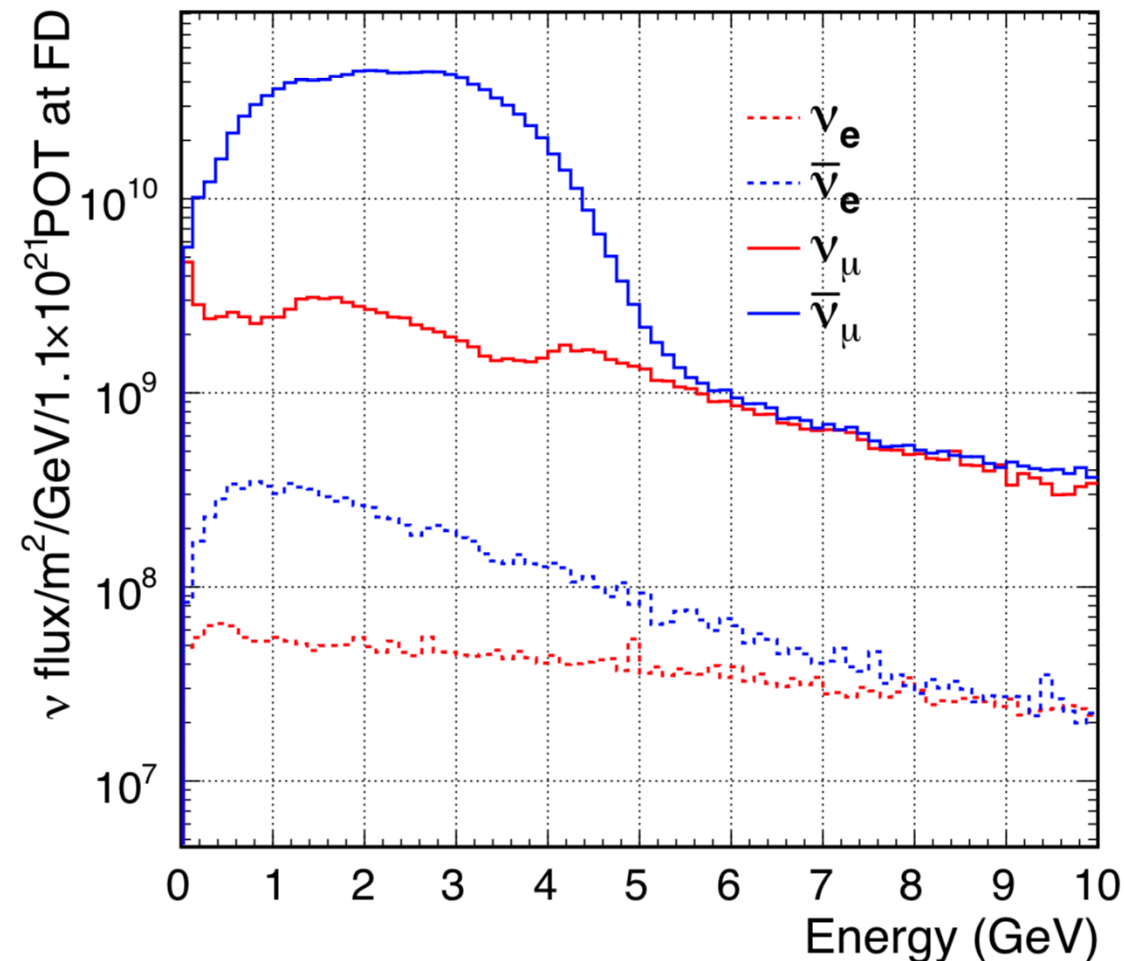
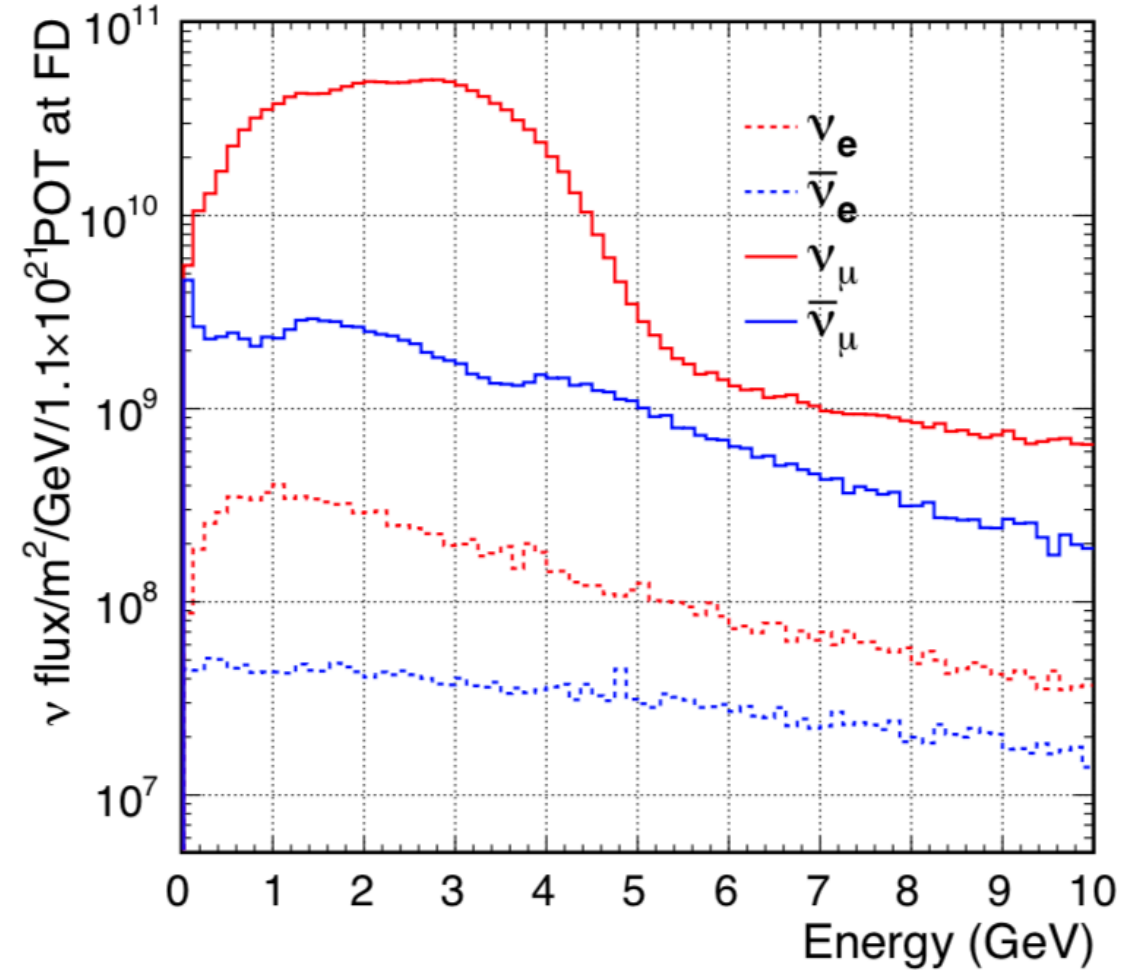
Laura Fields and Zarko Pavlovic

Goal

- Summarize ongoing work within the group
- Compile to-do list (please let me & Laura know what is missing)
- Keep it on redmine and update as we go:
https://cdcvs.fnal.gov/redmine/projects/lbne-beamsim/wiki/Task_List
- Identify where:
 - **work is being done (or is done),**
 - **more work could be done or will be needed, and**
 - **no work is done**

Flux prediction

- **Beam ntuples** (Laura)
 - official histograms:
<http://home.fnal.gov/~ljf26/DUNEFluxes/ntuples/>
/pnfs/dune/persistent/stash/Flux/g4lbne/v3r5p4/QGSP_BERT/OptimizedEngineeredNov2017
 - Will need to update at some point to include changes in geometry, g4 version, more stats, ...
- **On/off-axis plots for TDR** (Luke, ZP)



Systematics

- **Hadron production**

- **PPFX** (Amit, Luke, Leo)

- need to implement flux reweighing, not just evaluate systematics

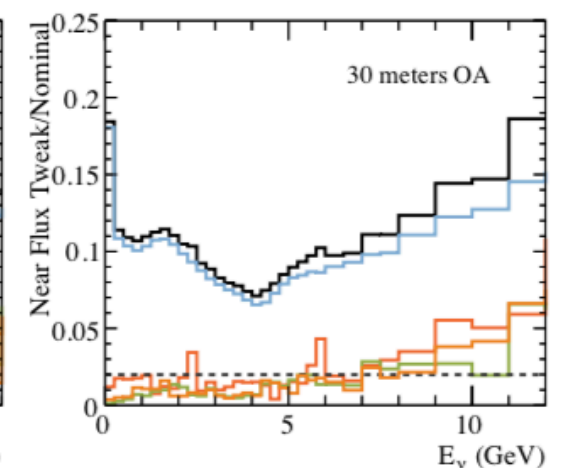
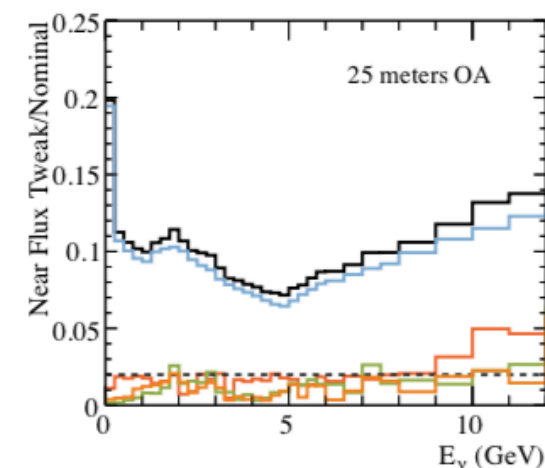
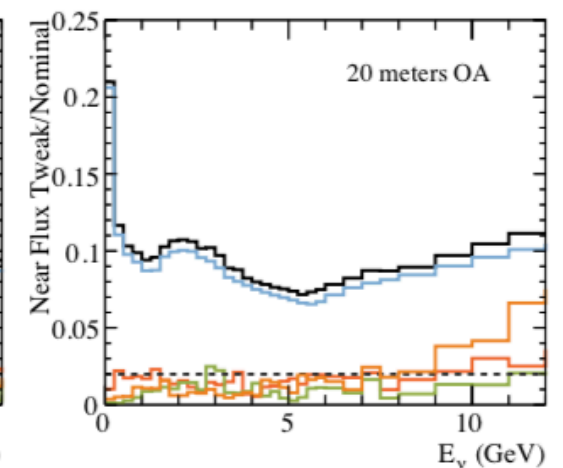
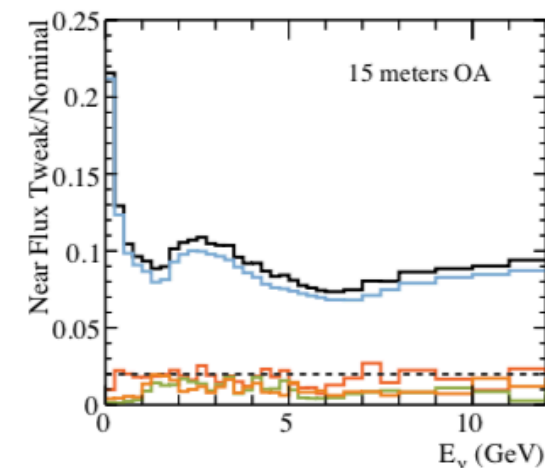
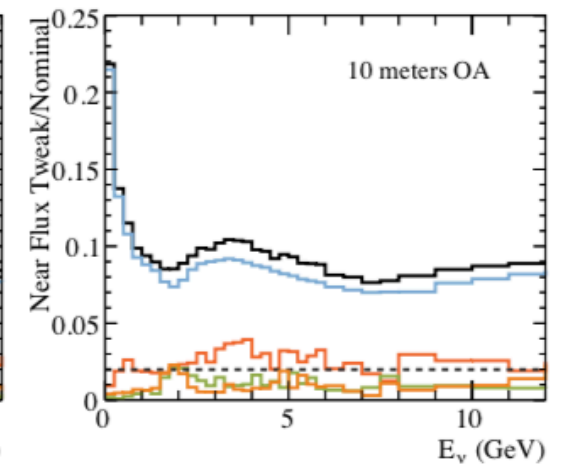
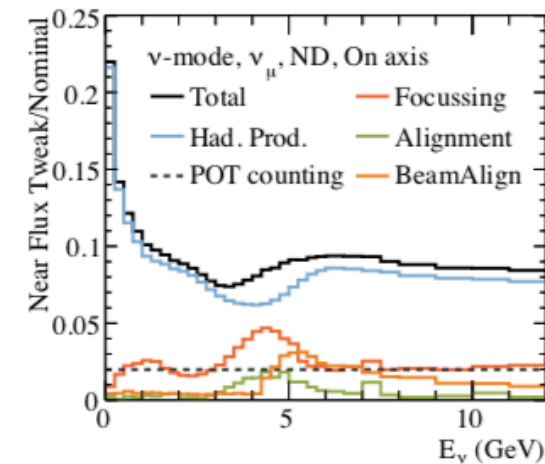
- **Updates:** (Leo, ?)

- **NA61, EMPHATIC,**
- **Missing systematics (elastic scattering)**
- **Impact of assumed correlations**

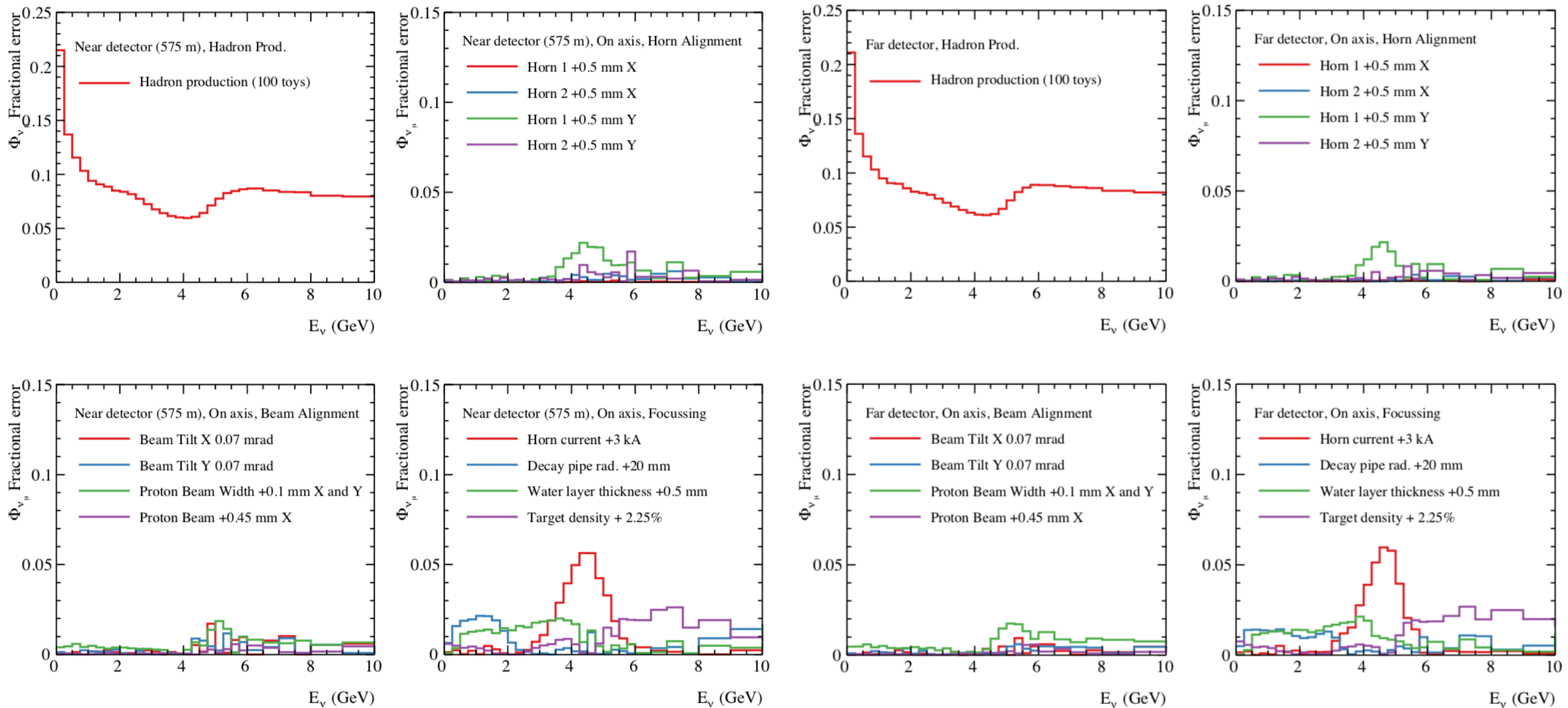
- **Non-hadron production**

- **Beam, target, horn, ... misalignments (Luke)**
- **B field (Miguel)**

- **Propagate to physics groups (Luke)**



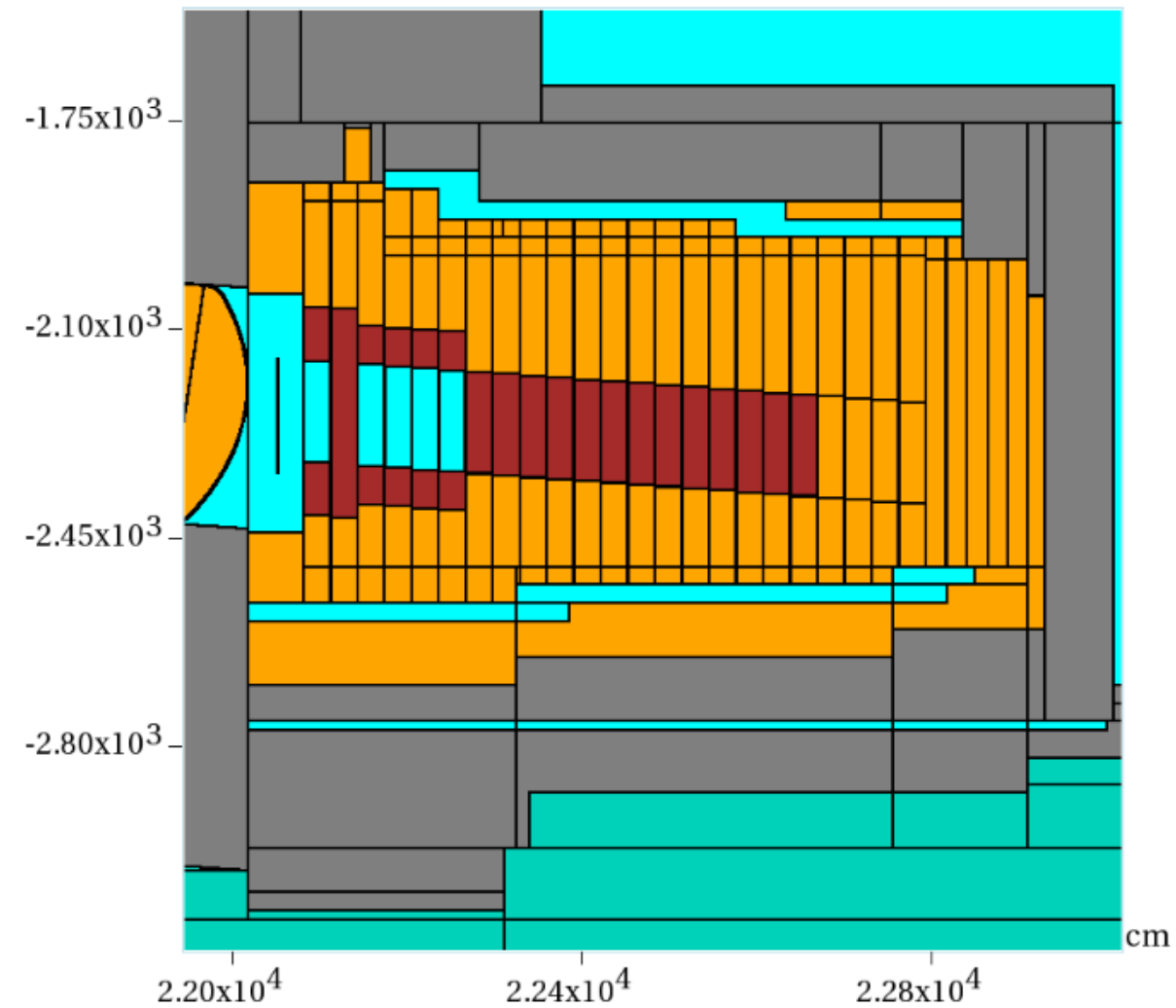
Systematics (cont'd)



plots from Luke P.

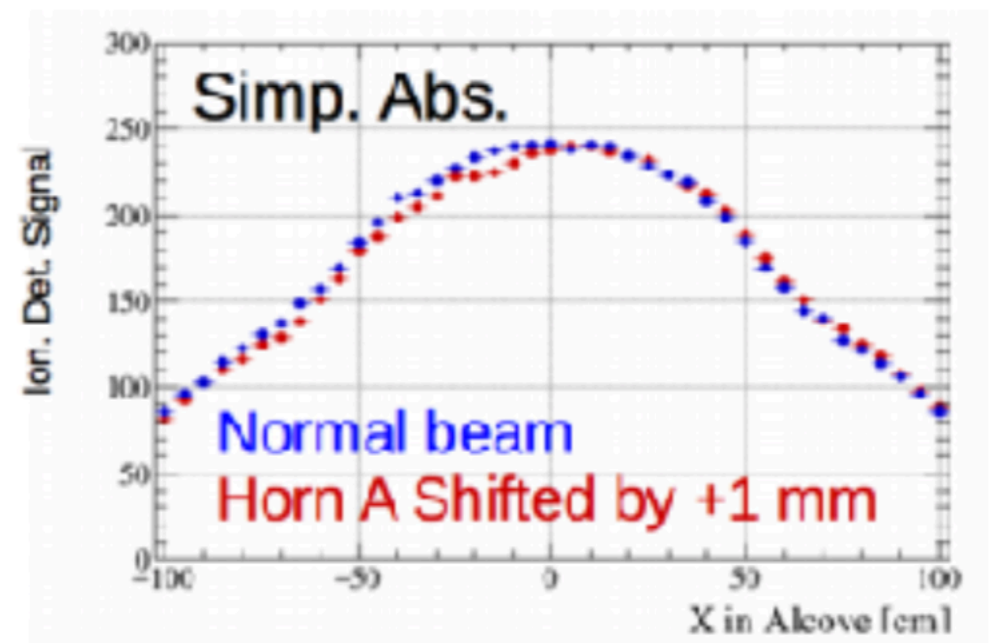
Beamline Geometry

- **Target** (John)
 - Multiple designs
- **Horns** (ZP)
- **Absorber, baffle(t), ... (?)**
 - need someone implement new geometry/study systematics



Muon Monitors

- Design
 - Ionization chambers, Threshold Gas Cherenkov, Stopped Muon Counters (CU)
 - Margarita (Chuck, Tyler)
- **Beam MC studies** (?)



Misc.

- **Beam tunes** (Tom)
- **G4LBNF**
 - **Include decays at rest** (?)
 - **Tau neutrino production** (Leo?)
 - **Code cleanup** (?)
- **Optimize beam for tau appearance** (Jogesh, ?)
- **Update documentation** (?)

Task list

- Keep an updated list:
https://cdcvns.fnal.gov/redmine/projects/lbne-beamsim/wiki/Task_List

Beam Interface Working Group Task List

- General Beam Simulation Tasks
 - Make G4LBNF include neutrinos from decay at rest
 - Add tau neutrinos to flux ntuples (requires interface with Pythia or similar)
 - G4LBNF Code Cleanup
 - Geometry updates - absorber, bafflet
- Flux Uncertainties
 - Update PPFX so that it can produce a tuned flux, not just uncertainties on a tuned flux
 - Add uncertainty due to elastic scattering to DUNE Flux uncertainty budget
 - Add more data to PPFX
 - Study impact of assumed correlations in PPFX on DUNE flux uncertainties and uncertainties in near/far ratio
 - Make a complete suite of flux uncertainty for public talks
 - Compute flux uncertainties versus neutrino angle (a long-standing request of the near detector group)
- Beam Design
 - Optimize beam for tau appearance using optimized horns
- Muon Monitors
 - Sensitivity studies