

Progress Update

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UofT Neutrino/DM Meeting
June 23, 2017

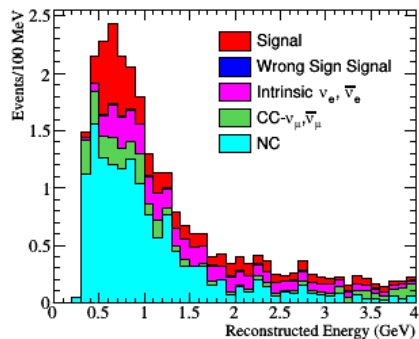
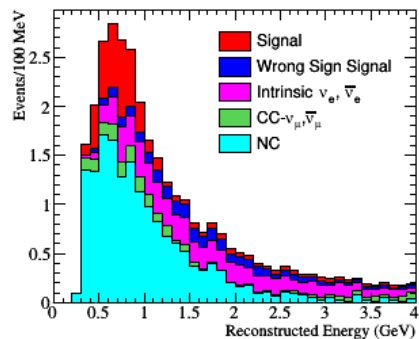
Aluminum Pipe for mPMT Prototypes

- Heard back from some companies about ordering a small amount of 20" OD aluminum pipe
- Modern International Trade Co.
 - 6061 aluminum
 - **Minimum 90 pieces**
 - \$287 / piece
 - \$25,830 total
- Foshan Kaiya Aluminum Co.
 - Asking for destination port ???
- Ningbo City Beilun Fayi Metal Product Co.
 - Say they can do less than 10 pieces
 - In communications (has price ready, but needed our company info)

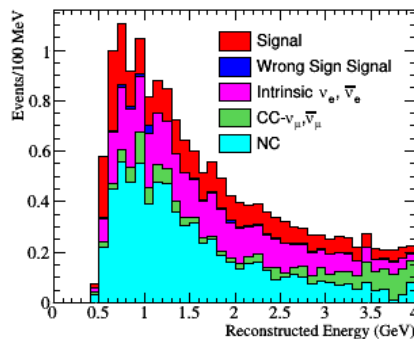
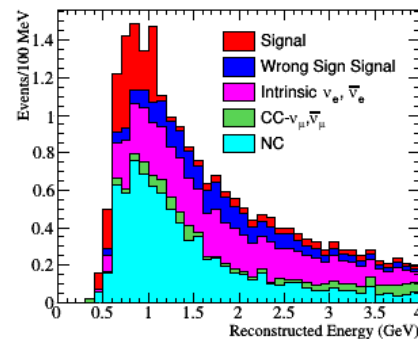
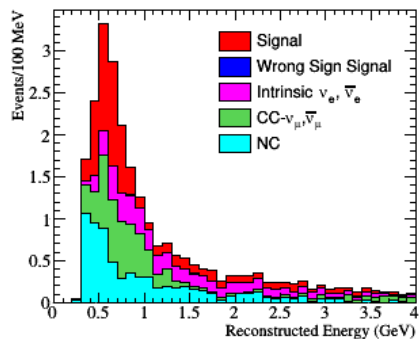
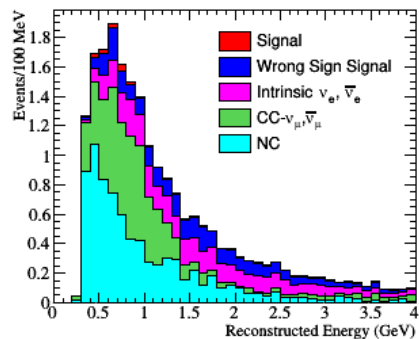
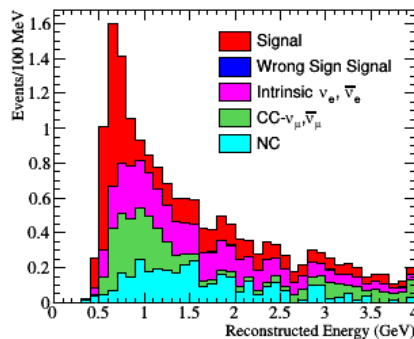
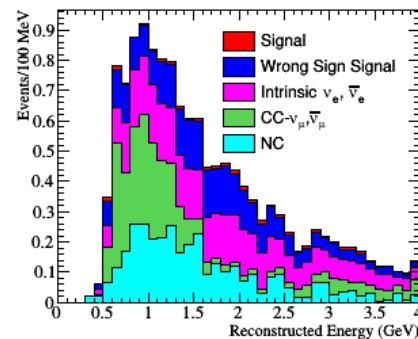
ν_e CC1 π^+ Studies

$$\nu_e + p/n \rightarrow e^- + \pi^+ + p/n$$

- Still see conflicts between T2HKK selection with T2K MC vs atm MC
 - T2K MC gives larger NC contribution < 0.5 GeV in 2R selections
 - T2K MC gives larger $\nu_\mu/\bar{\nu}_\mu$ CC contribution < 1 GeV in 1R1de selection
 - Discrepancies in number of events passing selection

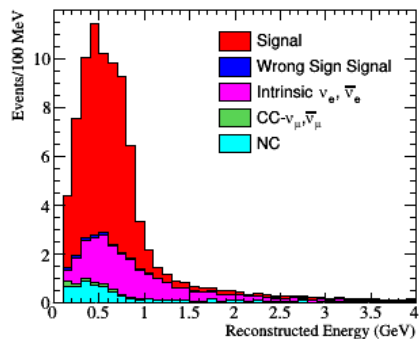
2Re π 0de, FHC, OAA=2.5°, 6.75E21 POT2Re π 0de, RHC, OAA=2.5°, 20.25E21 POT

T2K MC

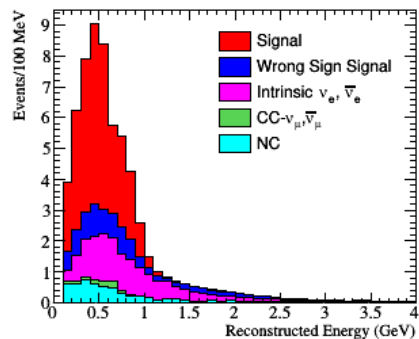
2Re π 0de, FHC, L=1100km, OAA=2.5°2Re π 0de, RHC, L=1100km, OAA=2.5°2Re π 1de, FHC, OAA=2.5°, 6.75E21 POT2Re π 1de, RHC, OAA=2.5°, 20.25E21 POT2Re π 1de, FHC, L=1100km, OAA=2.5°2Re π 1de, RHC, L=1100km, OAA=2.5°

atm MC

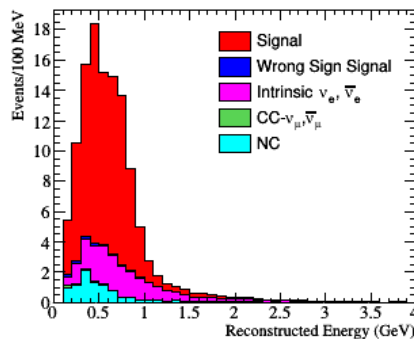
1Re0de, FHC, OAA=2.5°, 6.75E21 POT



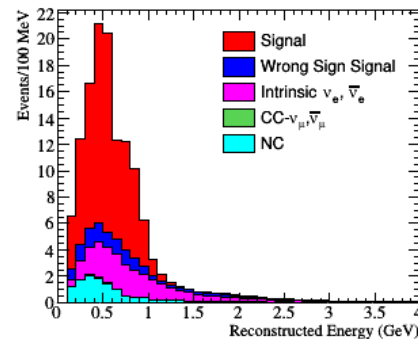
1Re0de, RHC, OAA=2.5°, 20.25E21 POT



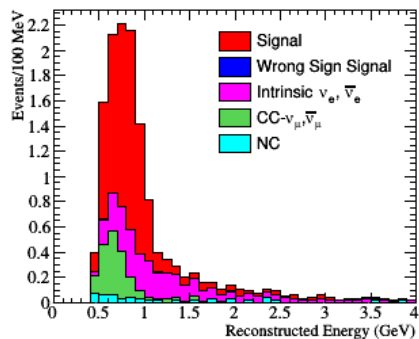
1Re0de, FHC, L=1100km, OAA=2.5°



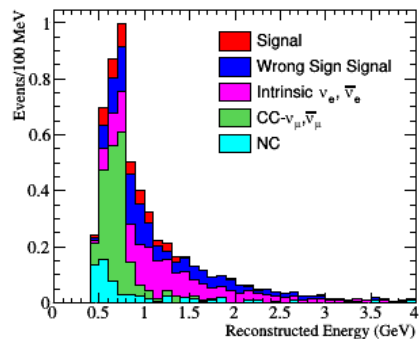
1Re0de, RHC, L=1100km, OAA=2.5°



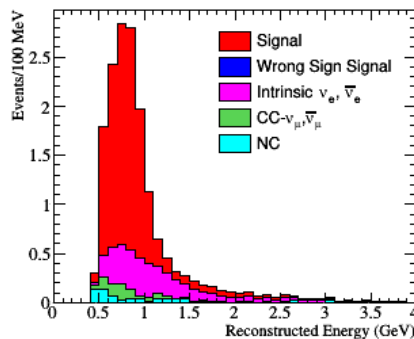
1Re1de, FHC, OAA=2.5°, 6.75E21 POT



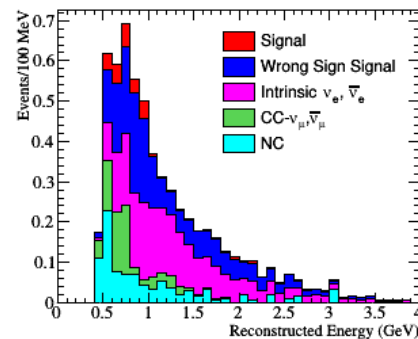
1Re1de, RHC, OAA=2.5°, 20.25E21 POT



1Re1de, FHC, L=1100km, OAA=2.5°



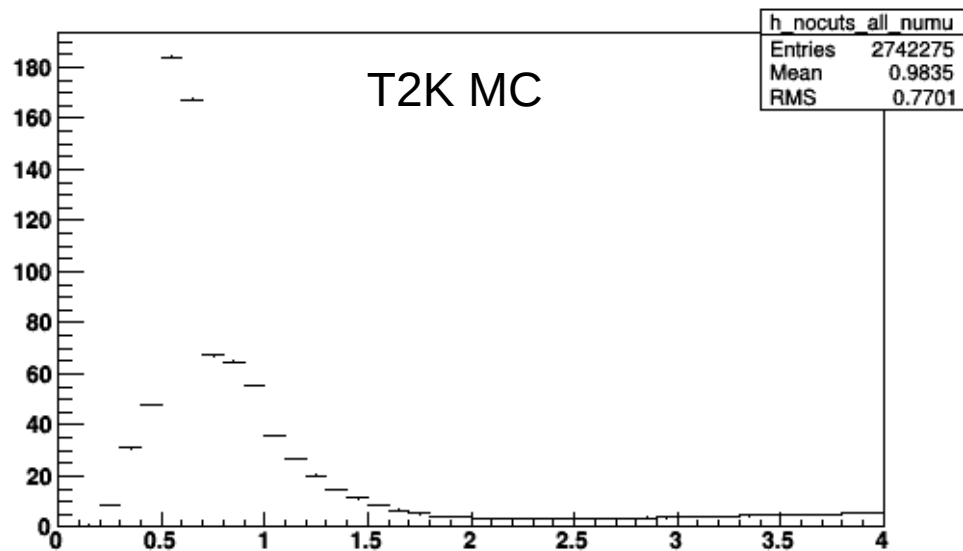
1Re1de, RHC, L=1100km, OAA=2.5°



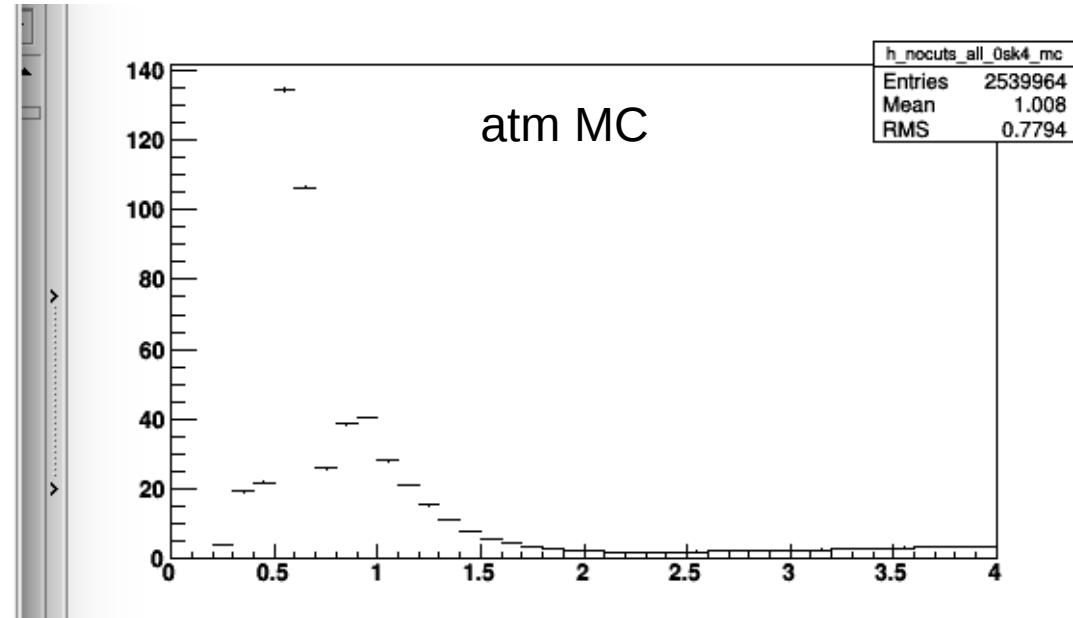
Neutrino/DM M

Events before any cuts (reweighted)

All events



True neutrino energy

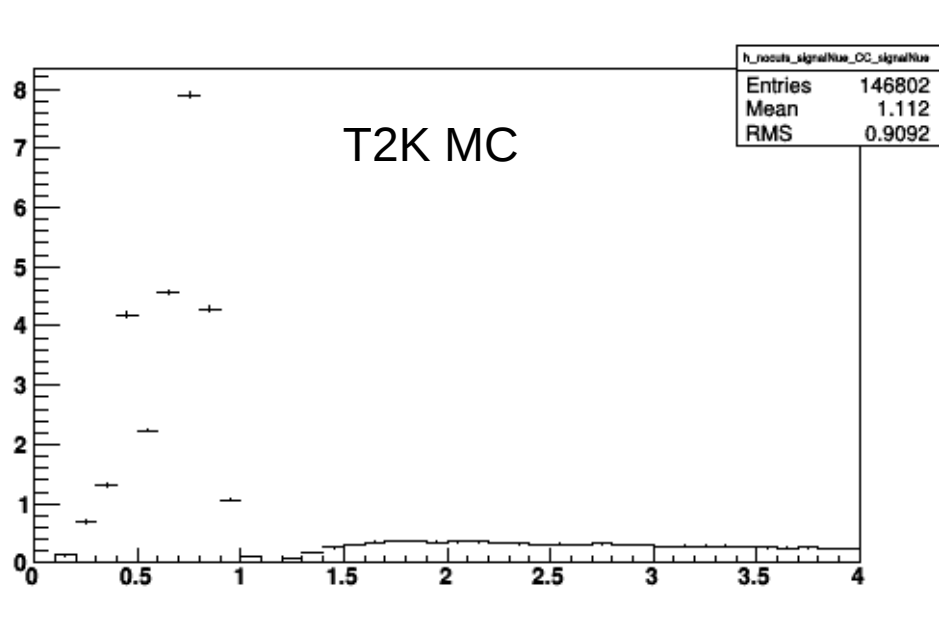


True neutrino energy

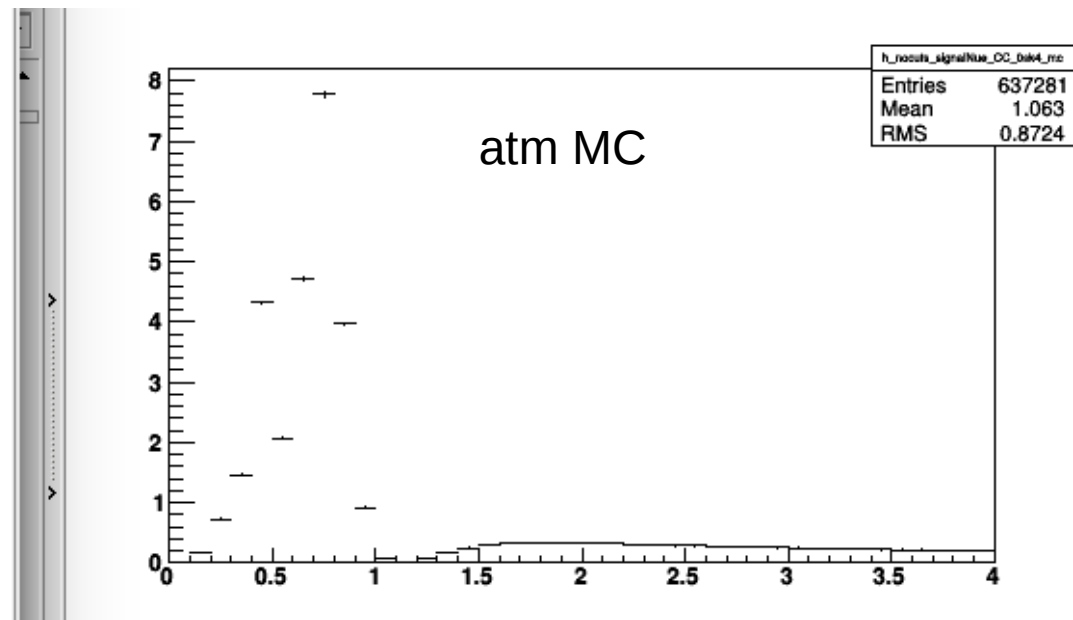
Number of events looks off... investigate different event categories

Events before any cuts (reweighted)

oscillated $\nu_{\mu e}$ CC events



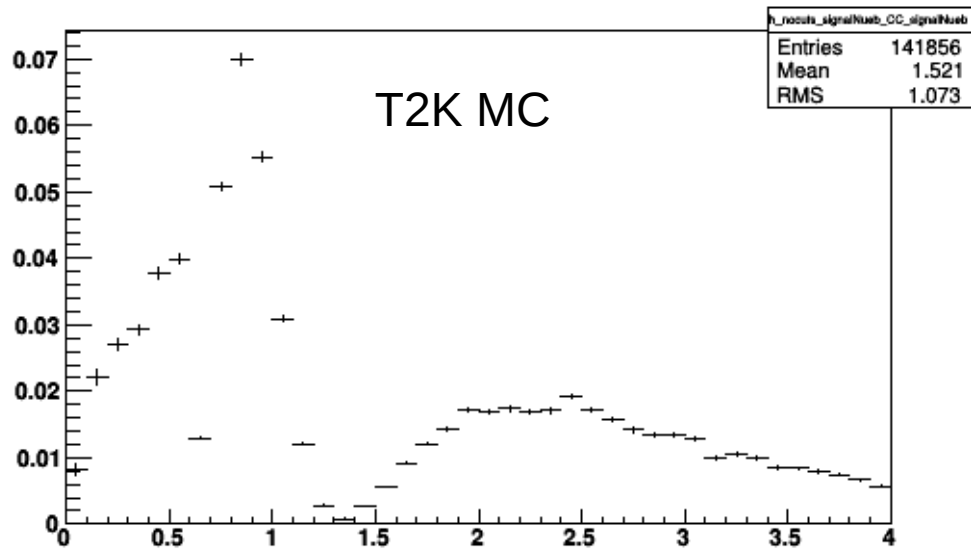
True neutrino energy



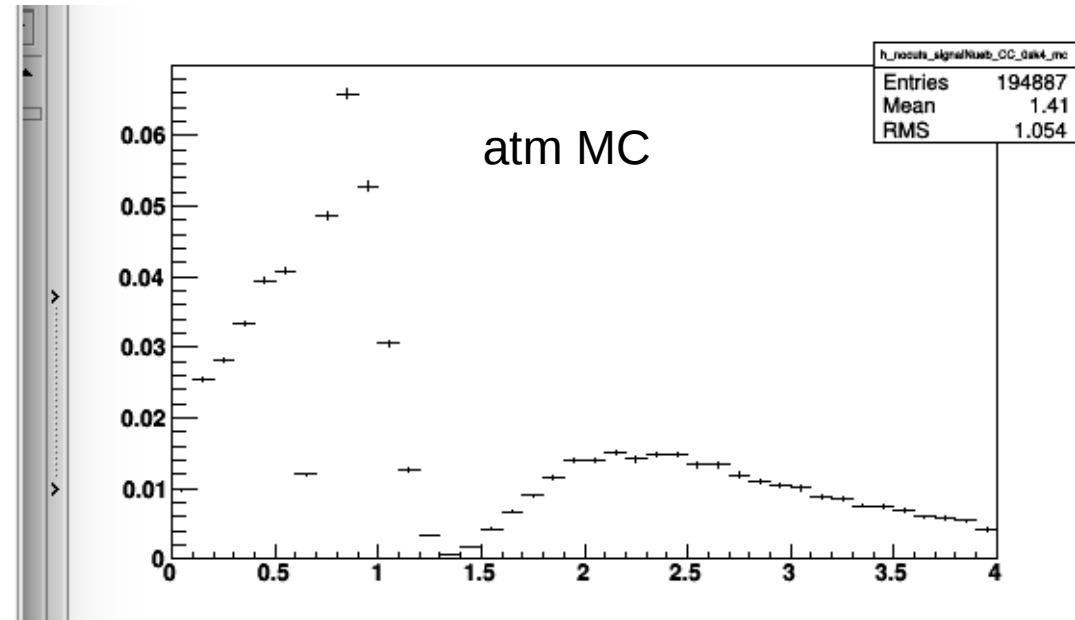
True neutrino energy

Events before any cuts (reweighted)

oscillated nuebar CC events



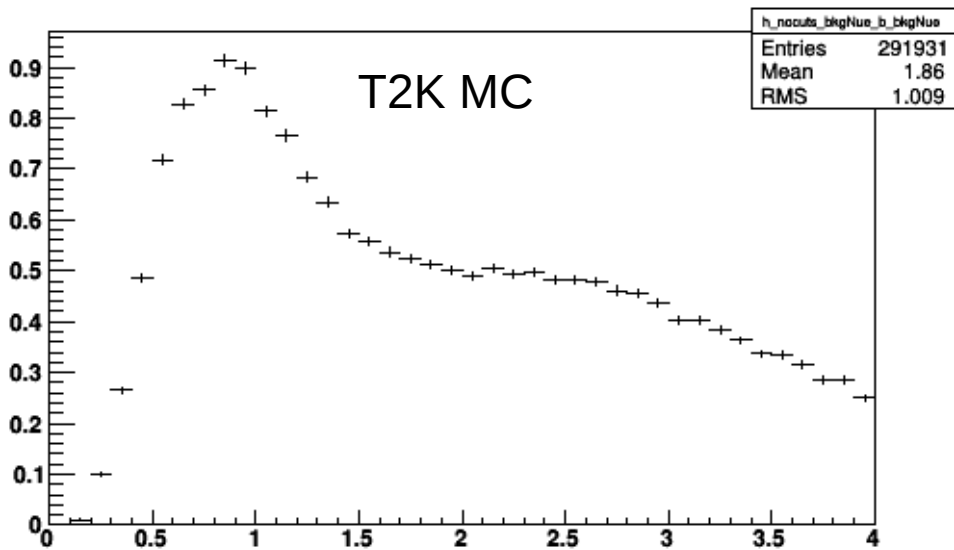
True neutrino energy



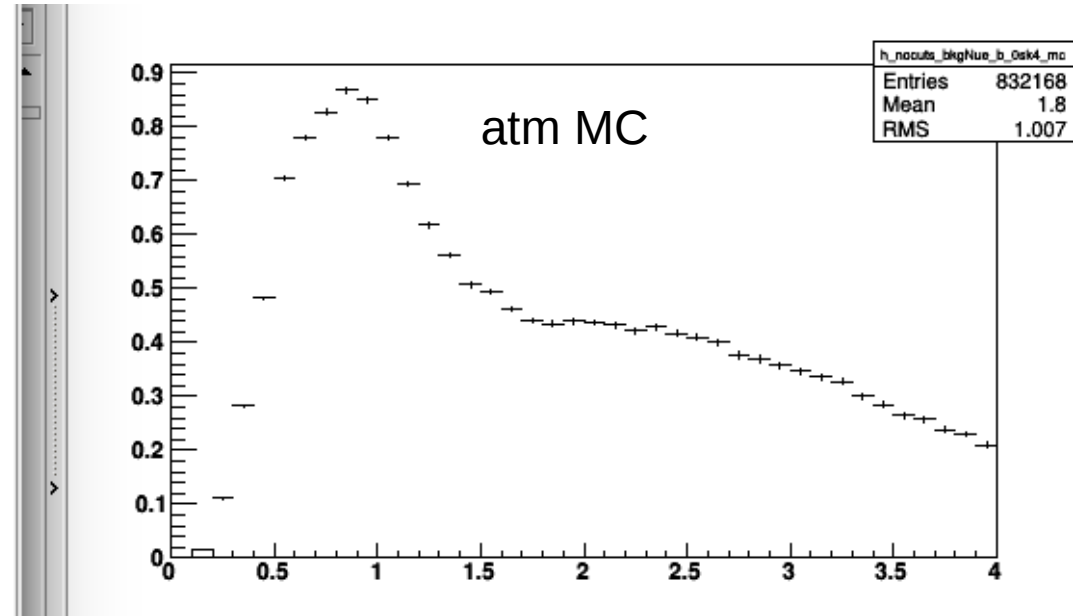
True neutrino energy

Events before any cuts (reweighted)

intrinsic nue CC events



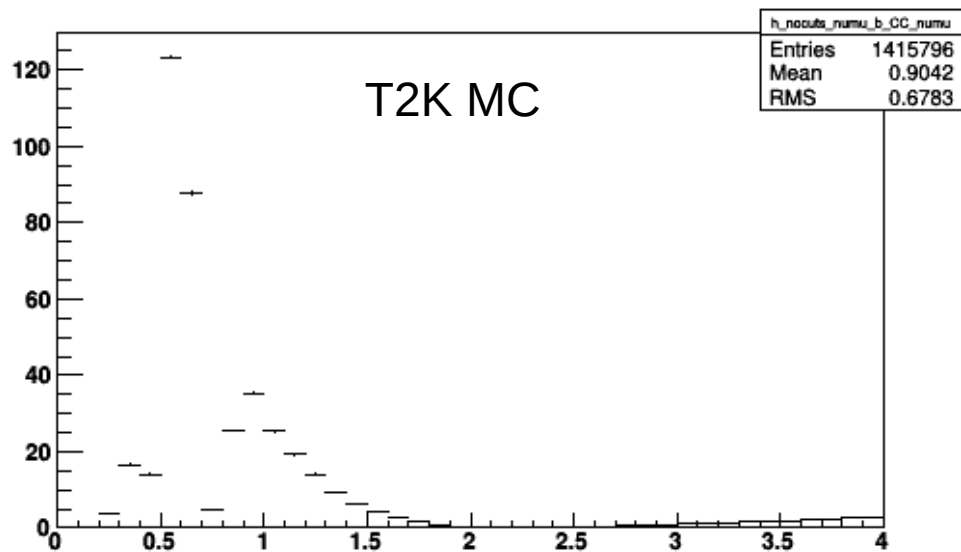
True neutrino energy



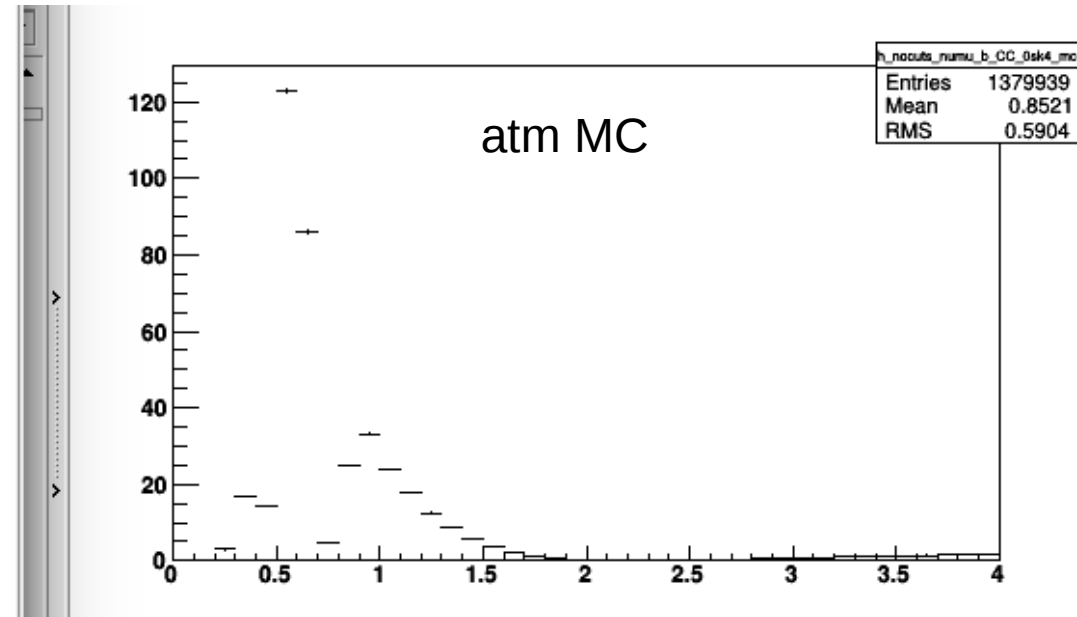
True neutrino energy

Events before any cuts (reweighted)

numu + numubar CC events



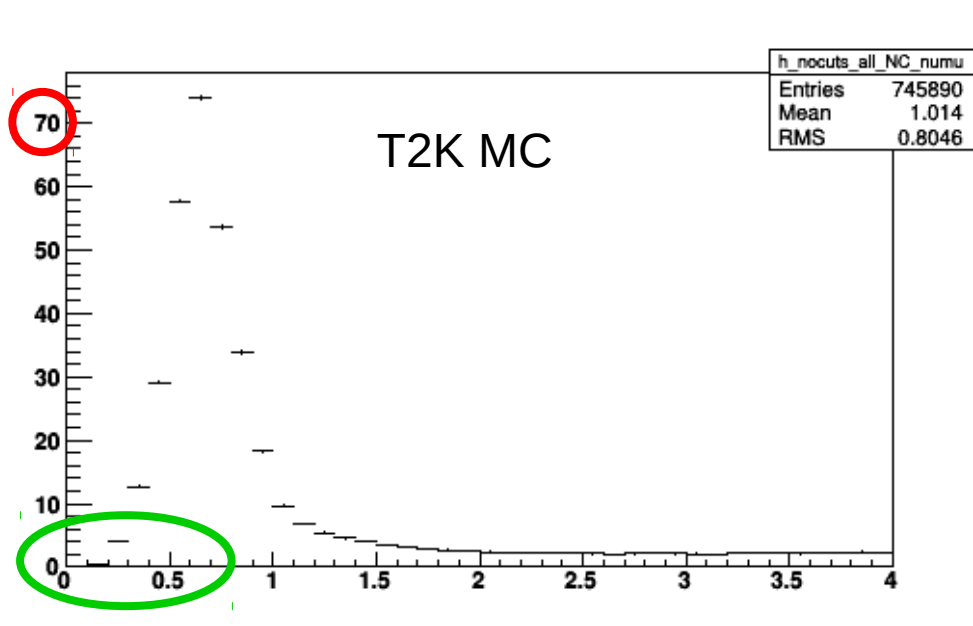
True neutrino energy



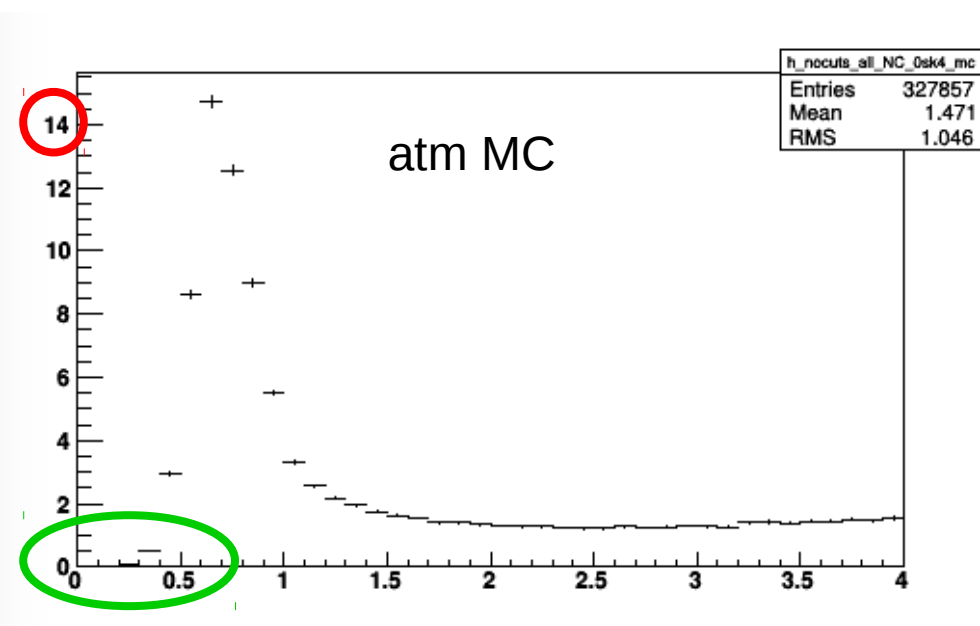
True neutrino energy

Events before any cuts (reweighted)

NC events



True neutrino energy



True neutrino energy

Something still clearly wrong with NC reweighting

Thoughts

- I thought I fixed NC issue in atm MC T2HKK selection
 - basically just reweighting events for the T2HKK flux / atmospheric MC flux without performing oscillations
- Will need to investigate further
- Is it worth the time, or should I just stick with the T2K MC selection from now on and forget about atm MC selection?
 - most likely that atm MC selection is where the errors are, but would be nice to have agreement between the two MCs just to be sure that the T2K MC selection is correct

T2K selection using standard 1R selections

- Used 1Re and 1Re1de selections from TN319
- Applied 2R selections only on events excluded by 1Re and 1Re1de selections
- Saw large improvement in 1Re and 1Re1de selection efficiencies
- I think this will make a good starting point for future improvements to 2R selection

