DIS Cross Section pME and pHE

June 8, 2006

The MINOS Collaboration Meeting

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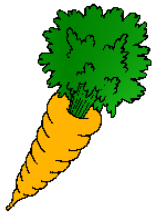


Monte Carlo

- R1.18.2, carrot 06, GNUMI flux v18, so far

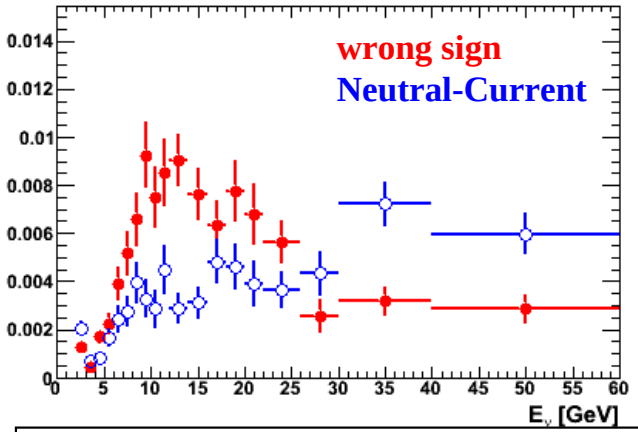
Beam	Total PoT	Total Files
LE-10	2.920E+19	2935
pME	0.376E+19	728
pHE	0.058E+19	391

- Same method and corrections, different beams
  - Debdatta's talk for LE-10
  - Look at pME and pHE with low statistics
  - Subtract contaminations (bin-by-bin)

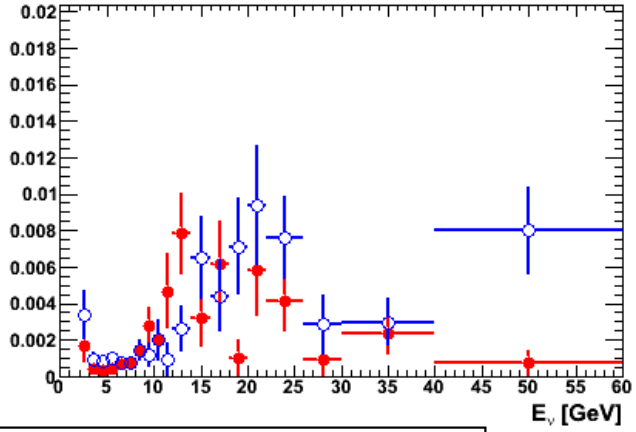
Contaminations

Neutrinos

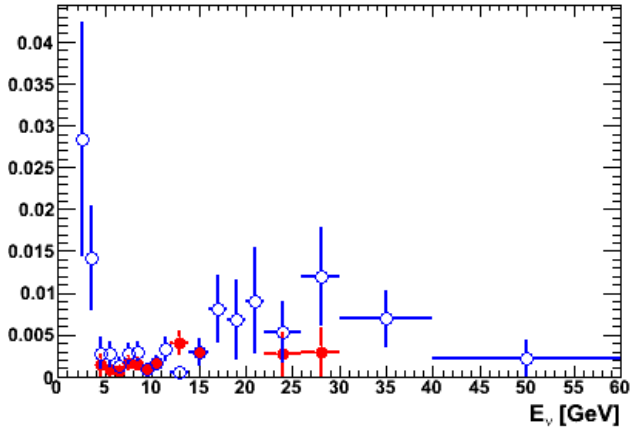
LE-10



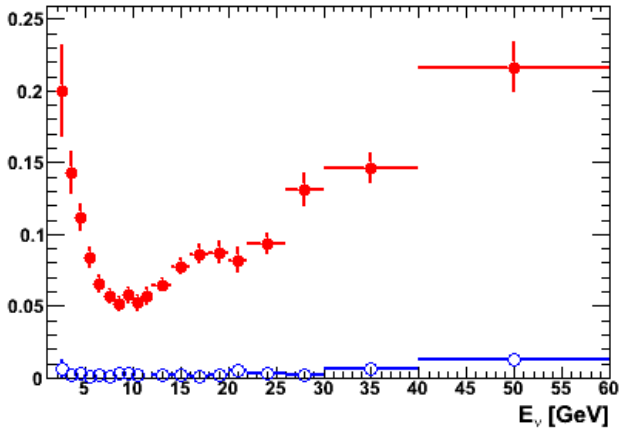
pME

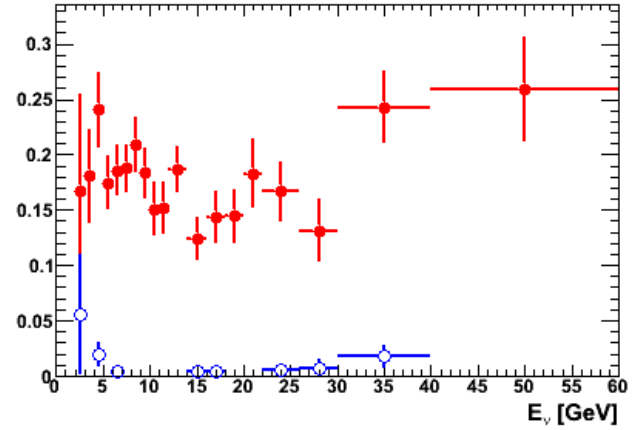


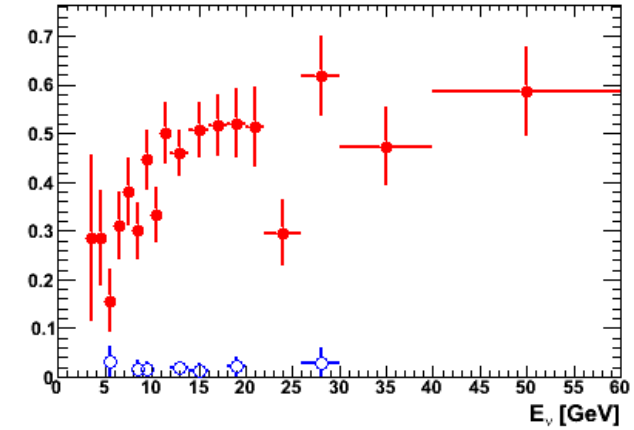
pHE



Antineutrinos (only downstream exiting sample)



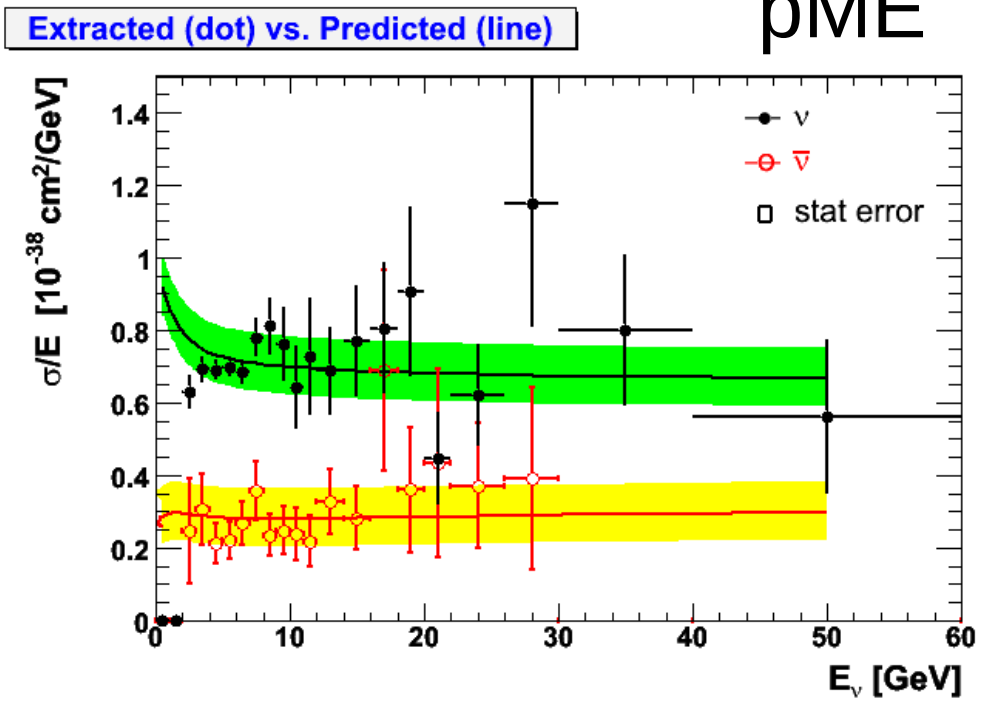




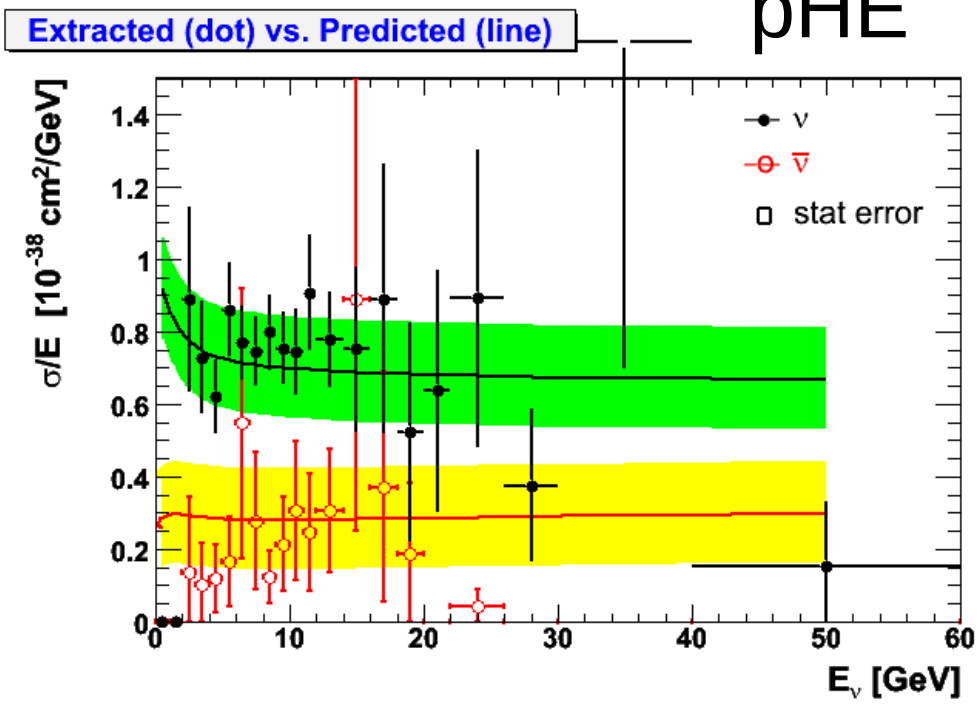
- LE-10 and pME has ν<1% (antineutrinos<3%) contamination in energy bins.
- pHE wrong sign contaminations are worse
- Should figure out how to reduce it (future), Now just subtracted them

Cross Section (Fake Data)

pME



pHE



- Fake data study for pME and pHE yet!
- Applied same corrections, already shown in LE-10, to get cross section
- Flux normalized to world average above 10 GeV
- Error band comes from normalization
- Same normalization factor to antineutrino

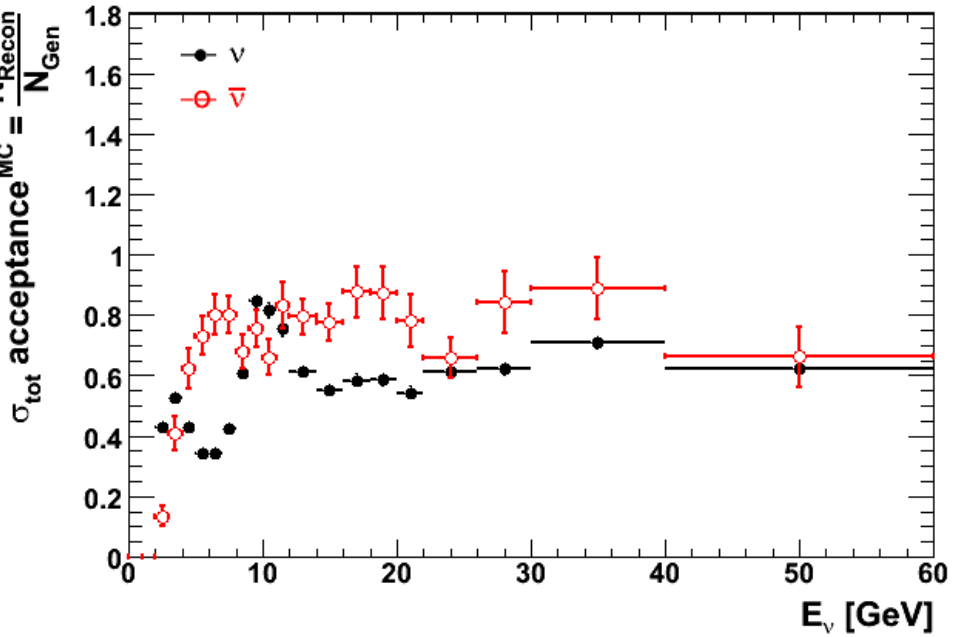
How many events?

Beam	MC PoT	DATA
pME	3.8E+18	1.7E+18
pHE	0.6E+18	1.2E+18

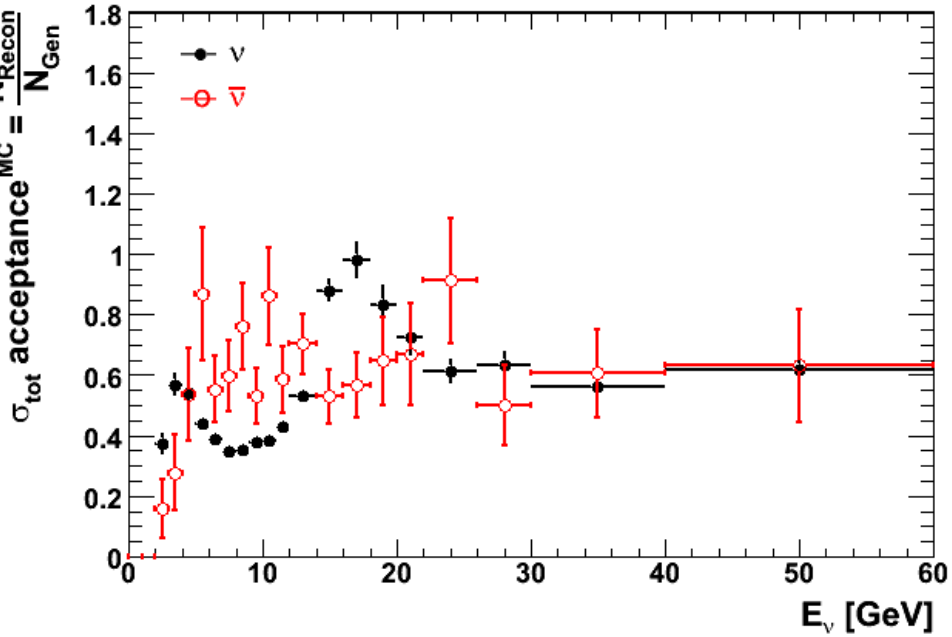
Cuts	MC		Data	
	pME	pHE	pME	pHE
Track in fiducial vtx	137632	36709	38726	81459
Fit quality cut	125699	33428	35598	74474
Begin plane |u-v|<6	121452	4211	34587	71790
Remove track (coil hole)	96806	4171	27582	56832
Emu > 2 GeV	64190	1204	17712	41635

MC Acceptance $= \frac{N_{CC}^{reco}}{N_{CC}^{true}}$

pME



pHE



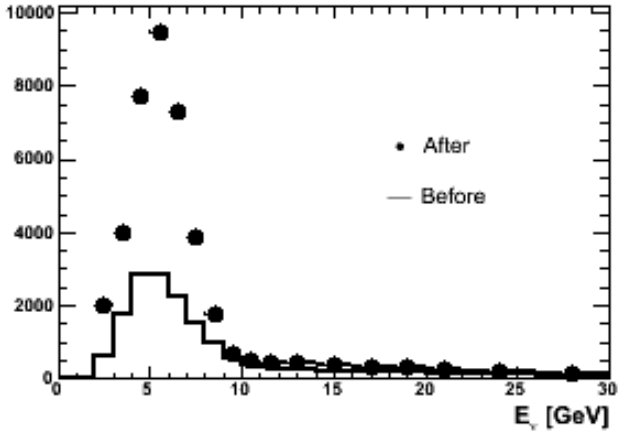
- Anti-neutrinos use only downstream exiting sample

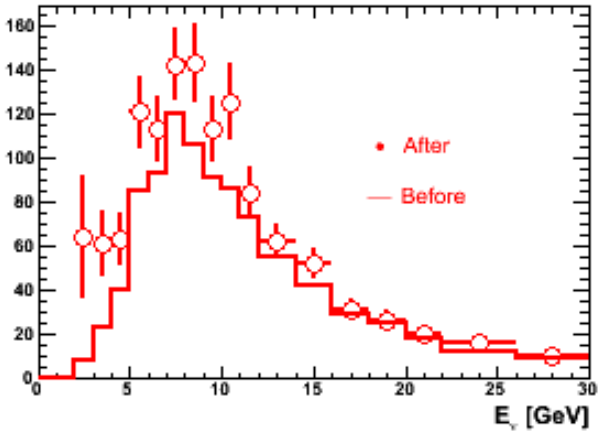
pME Data
(Before and After Acceptance Correction)

Neutrino

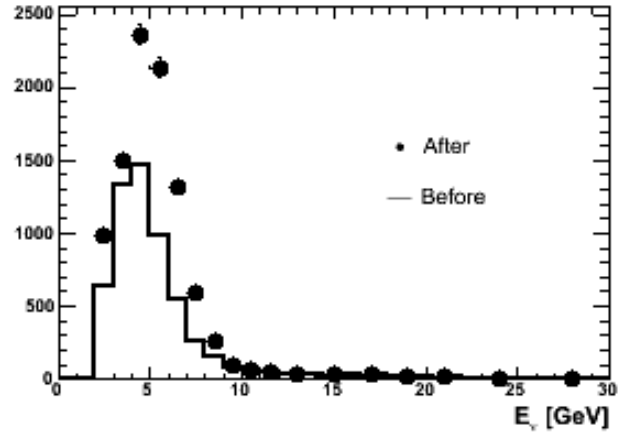
Anti-neutrino

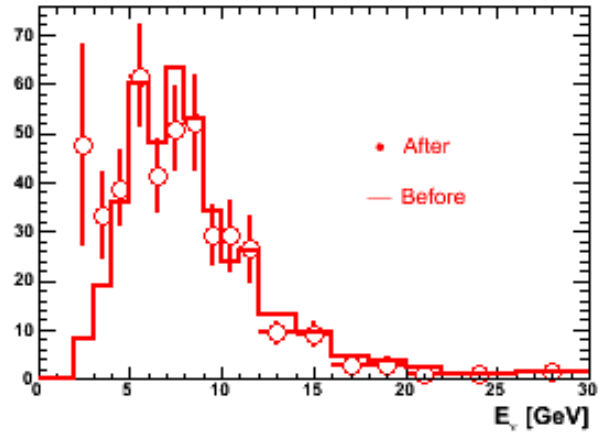
- Cross section sample





- Flux sample



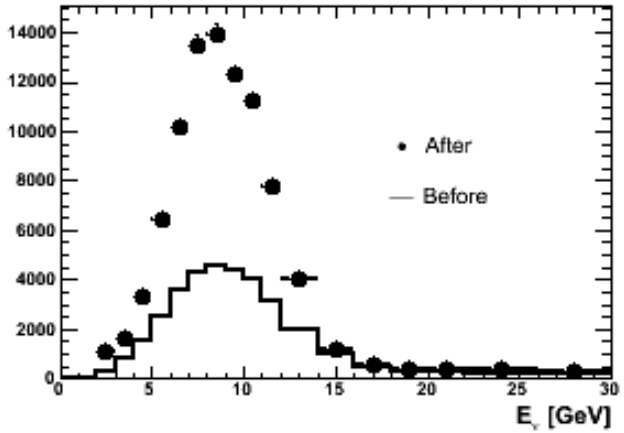


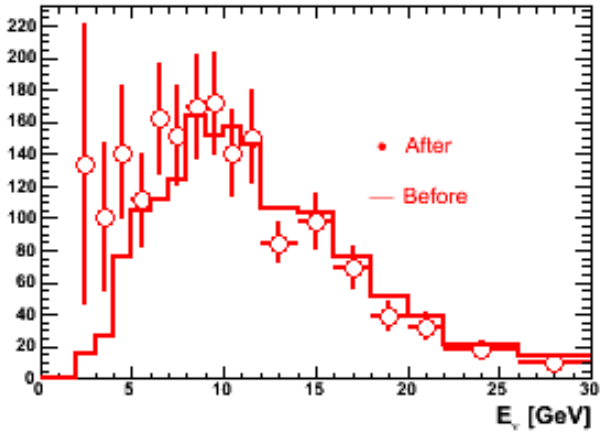
pHE Data
(Before and After Acceptance Correction)

Neutrino

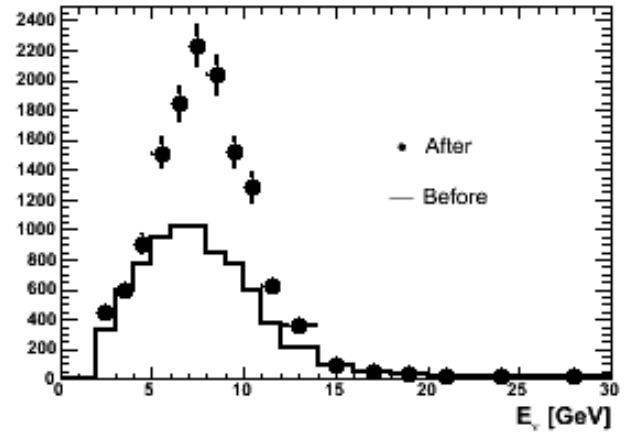
Anti-neutrino

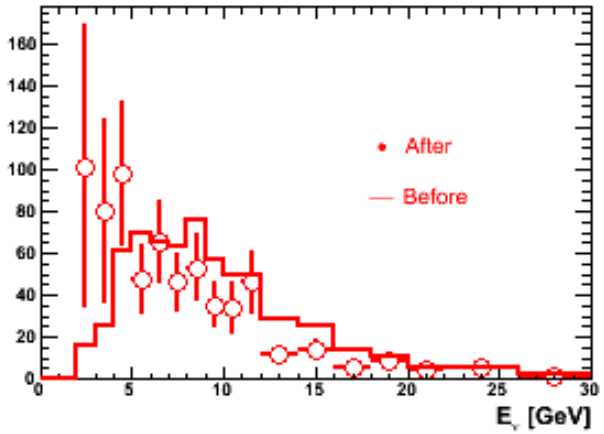
- Cross section sample



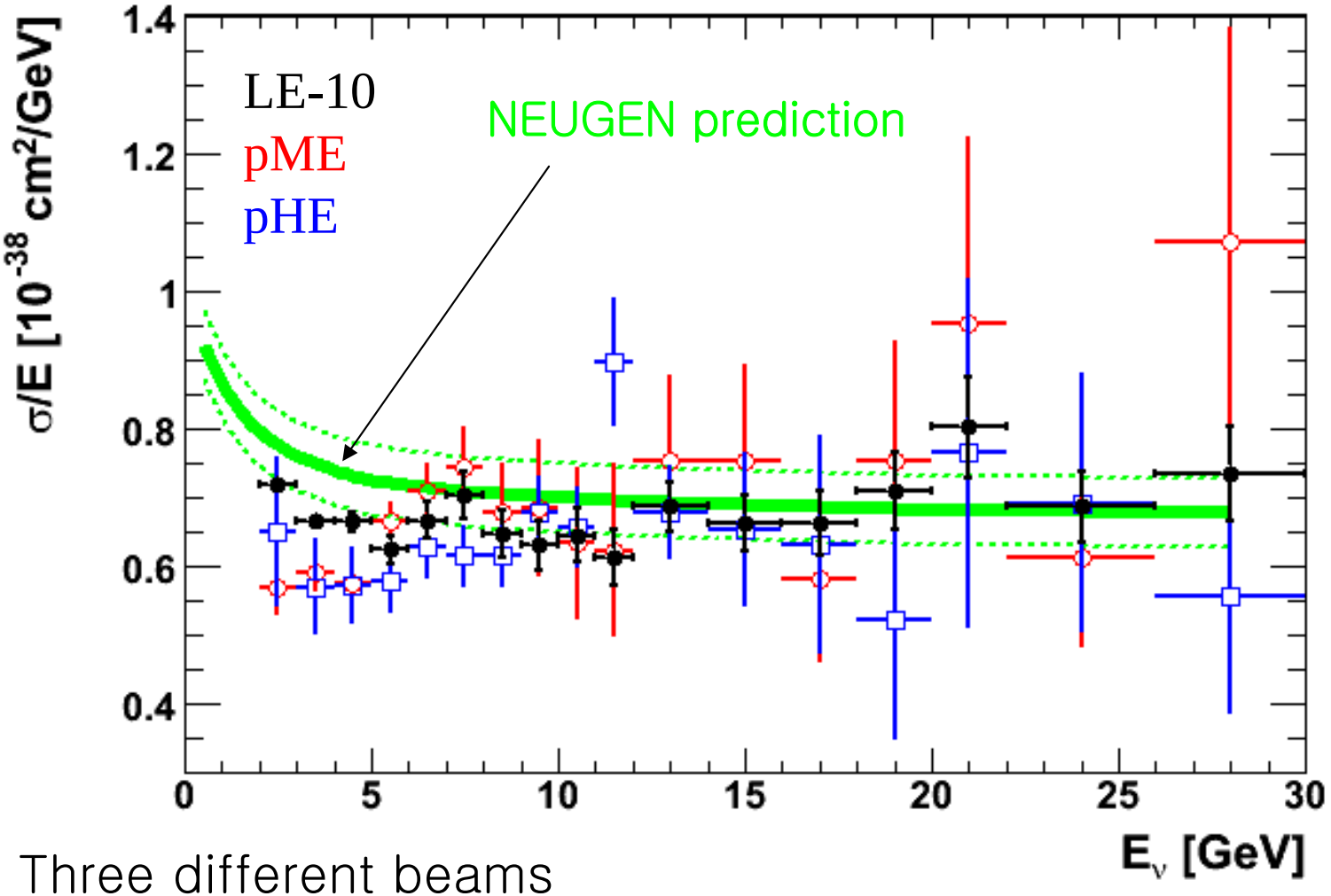


- Flux sample



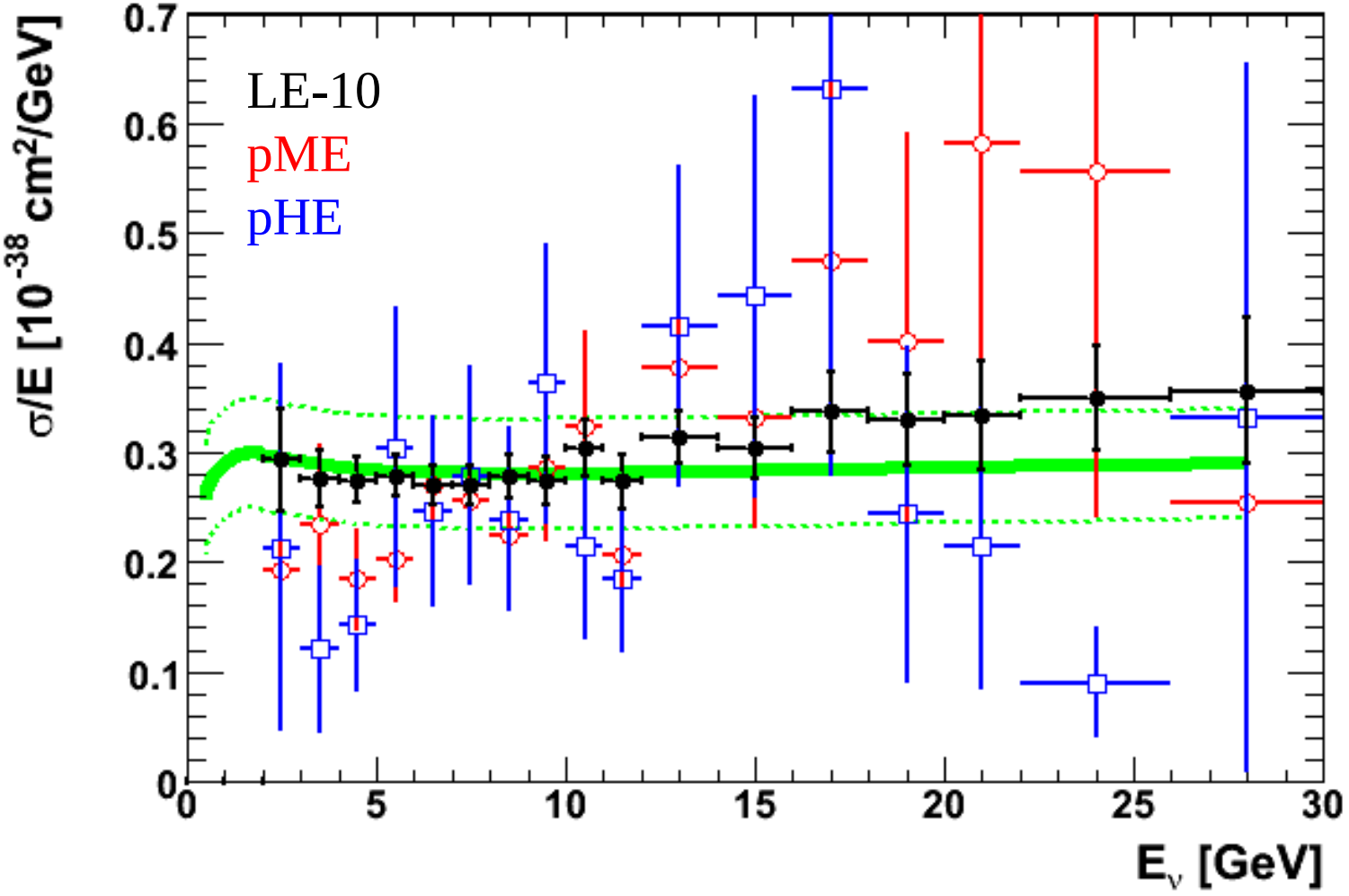


Neutrino Cross Section (Data)



- Three different beams
- Independent of GNUMI flux, used low-ν flux
- Normalized to world average above 10 GeV

Antineutrino Cross Section (Data)



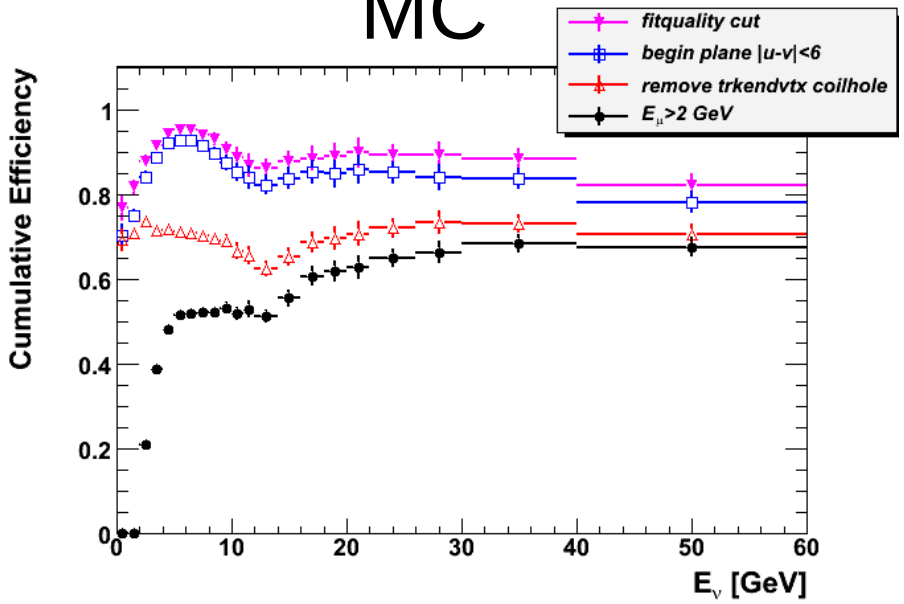
- Same normalization factor to antineutrino

Summary

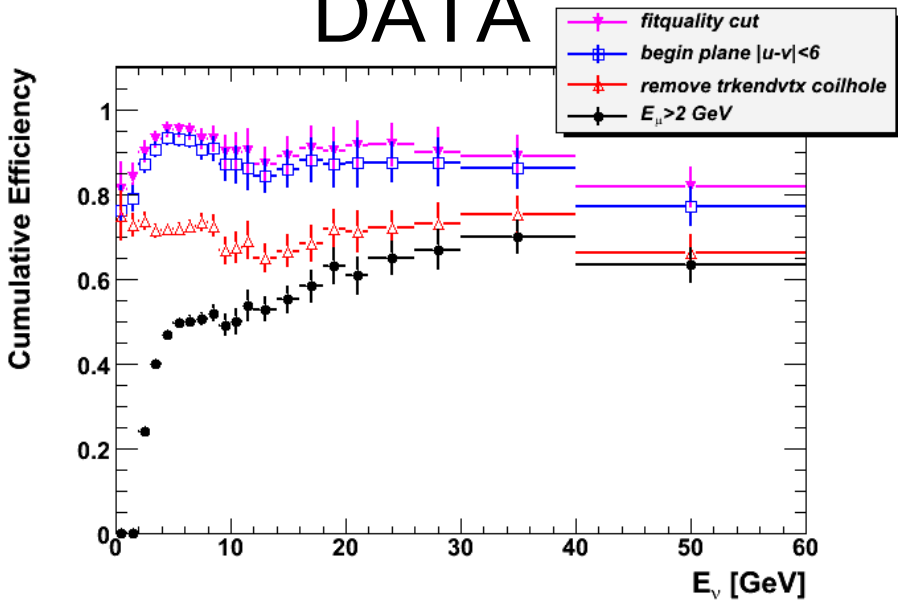
- Looked at pME and pHE beams
  - Subtracted Neutral Current and wrong-sign contaminations
  - Corrected for Quasi-Elastic cross section
  - Corrected for B/A
  - Will do Fake data study

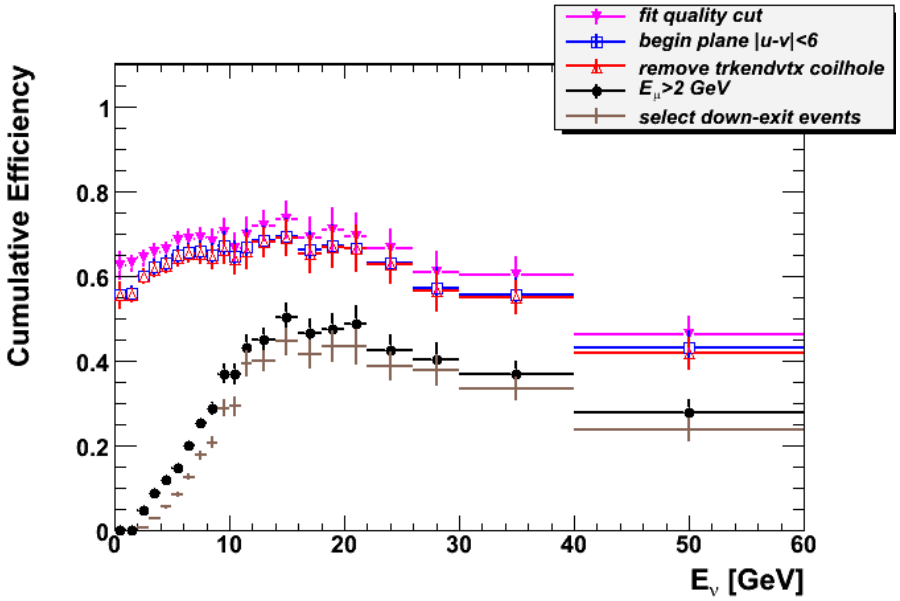
Efficiency vs. E_ν (pME)

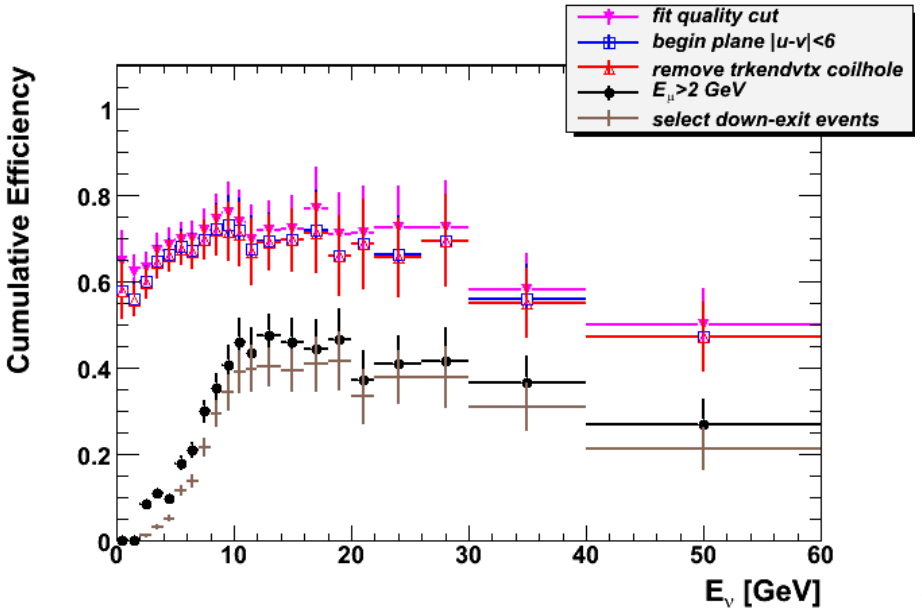
MC



DATA

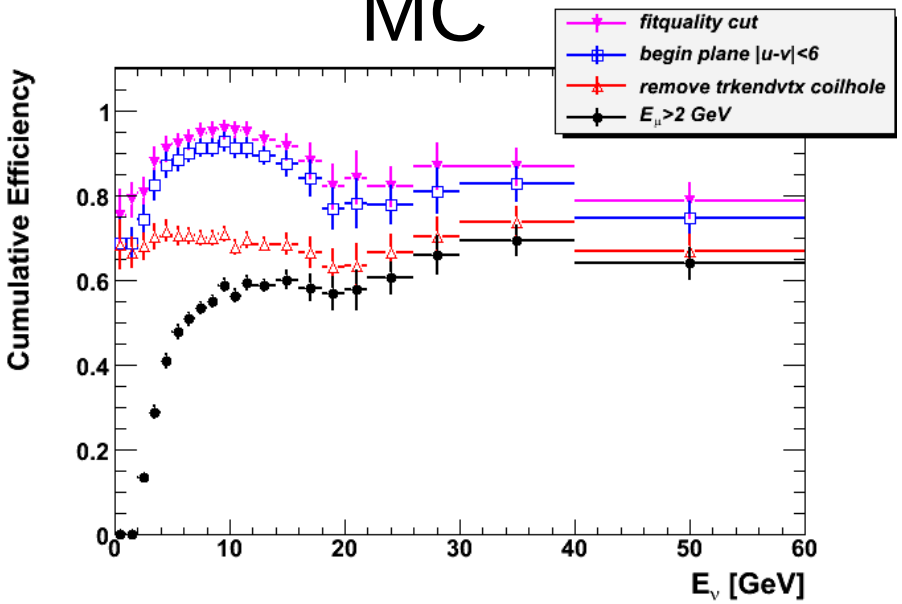






Efficiency vs. E_ν (pHE)

MC



DATA