

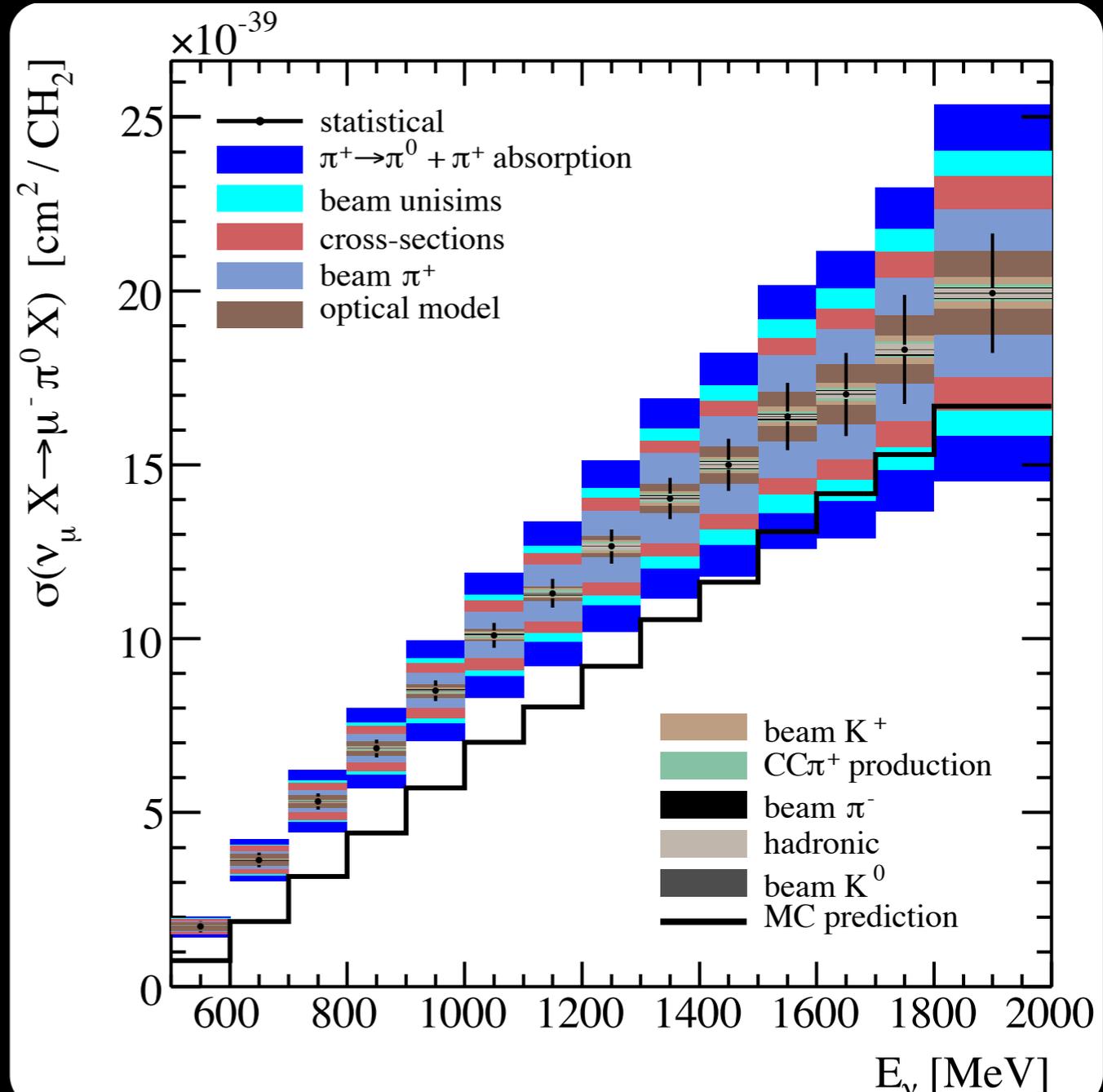
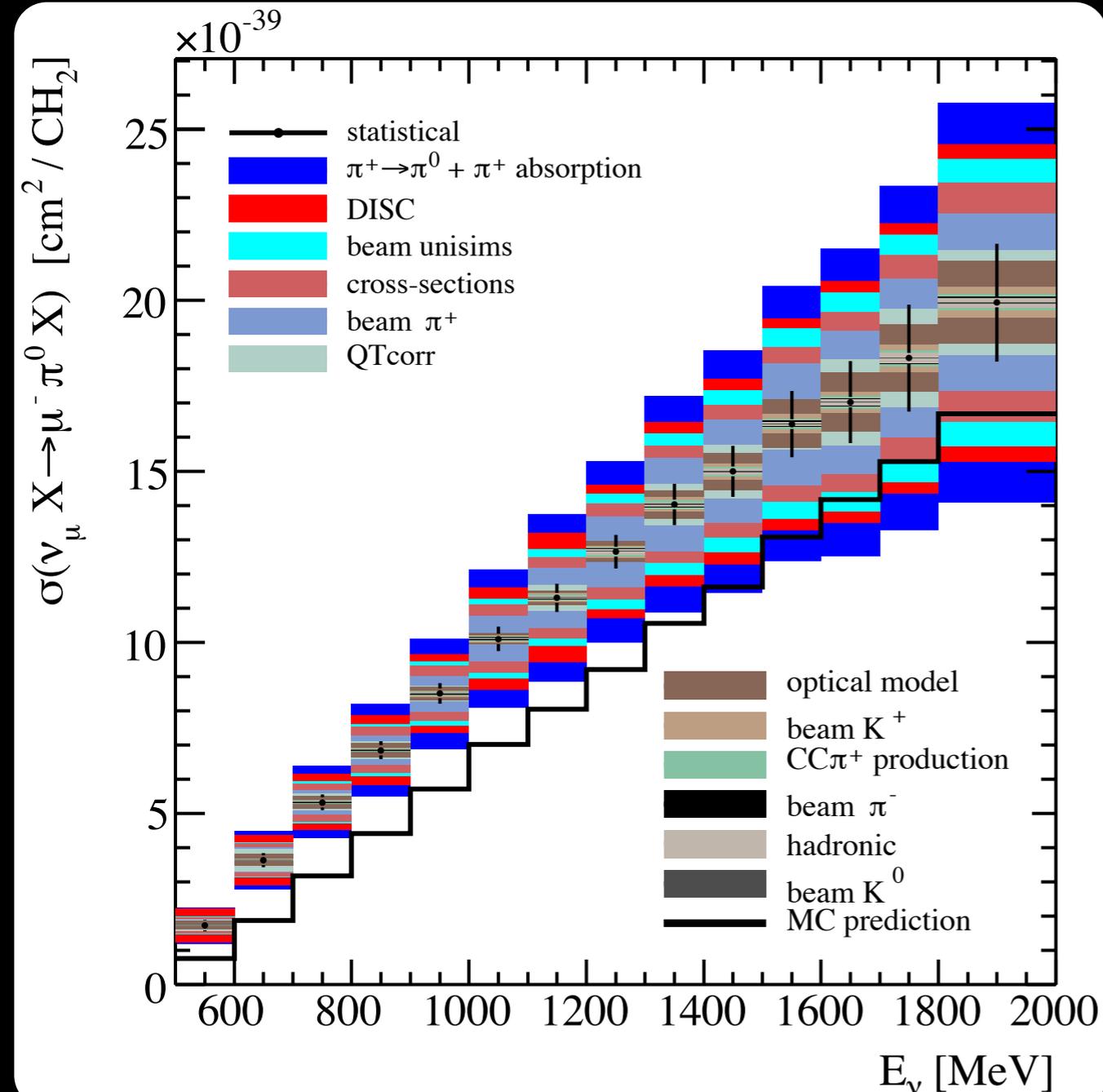
CCπ⁰ Update B

Robert Nelson
2009.12.15

Total CC π^0 observable cross-section

All Errors

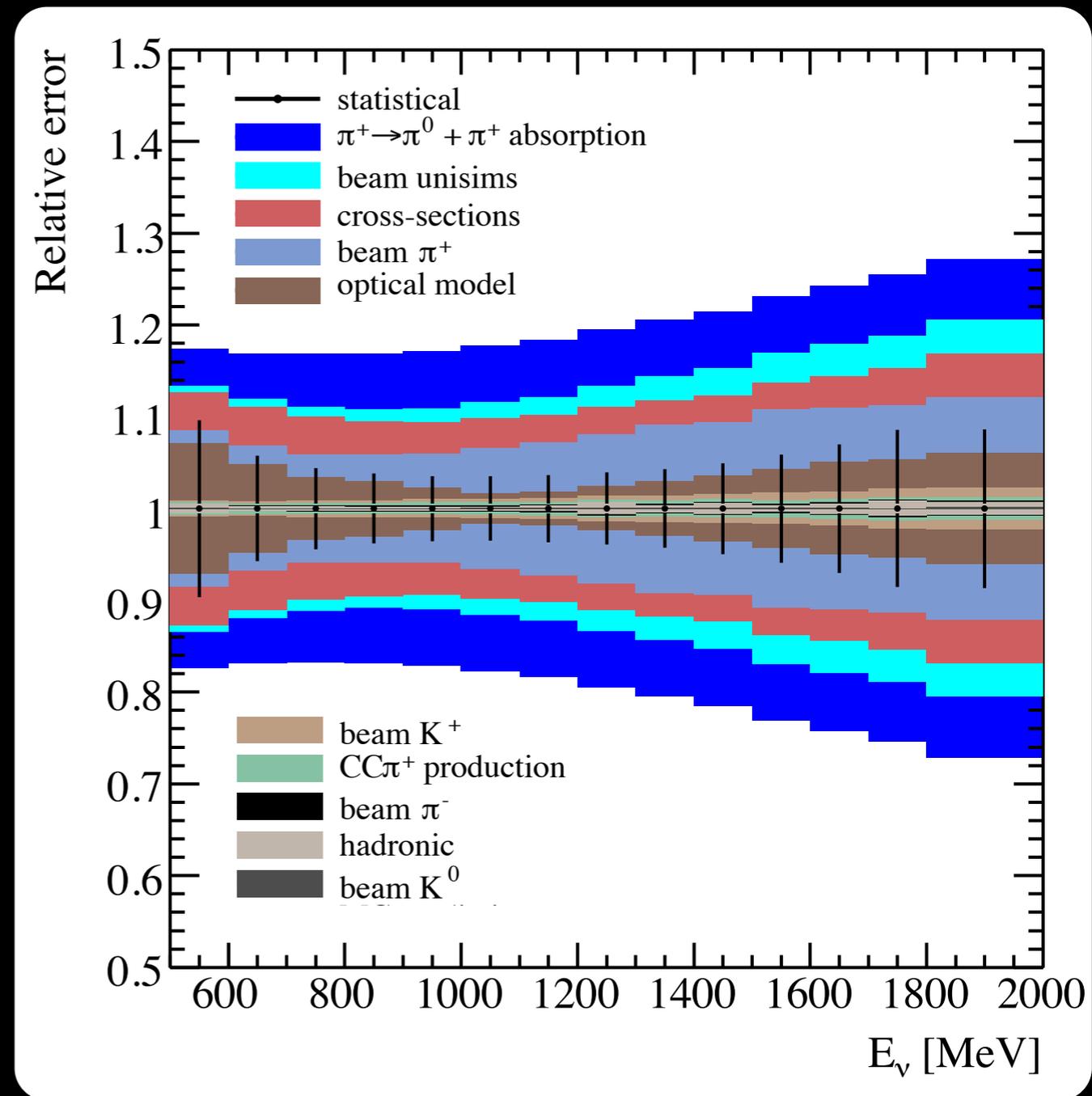
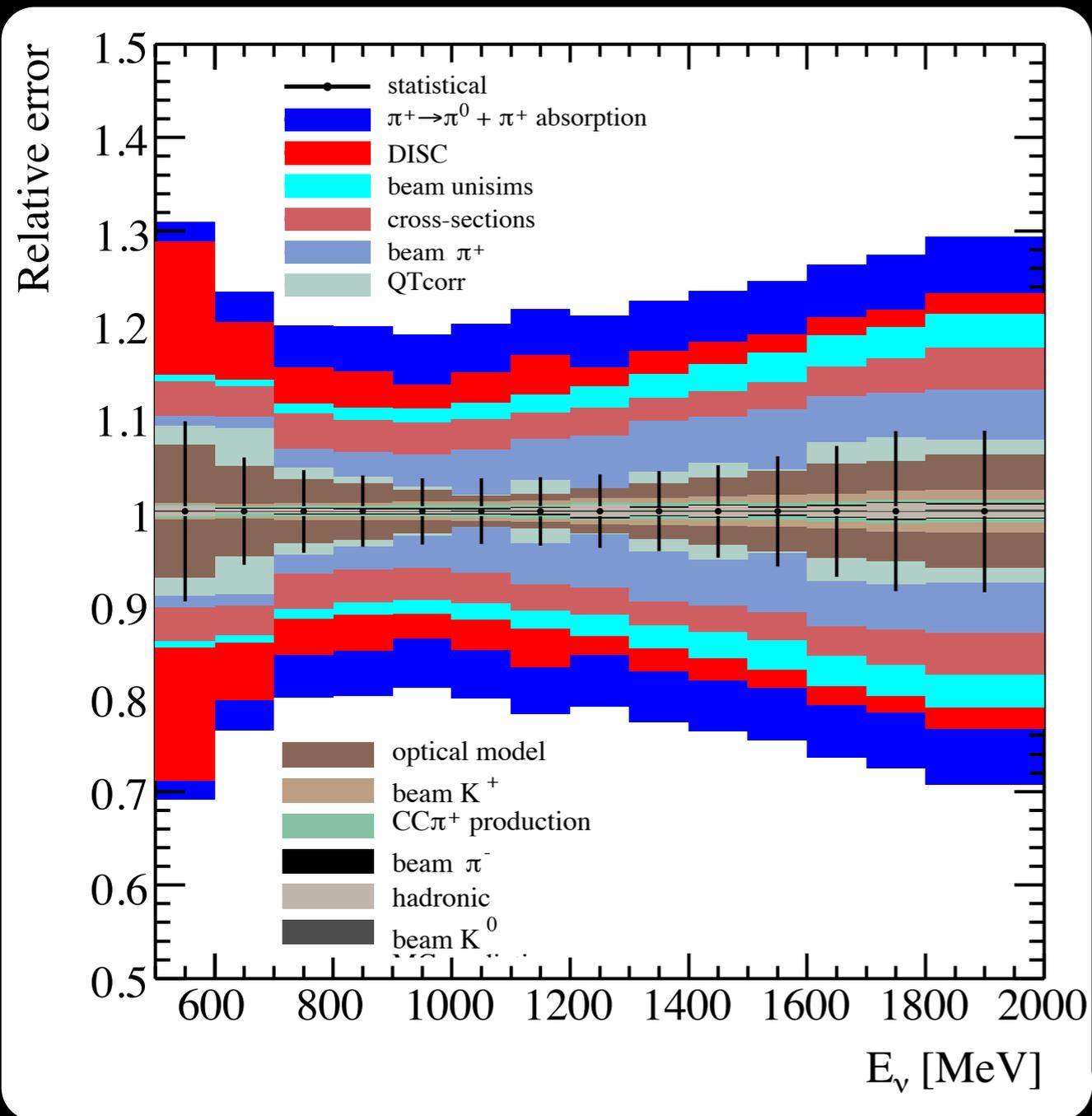
No DISC or QTcorr



- changed from per nucleon to CH_2 as it is more appropriate for an observable measurement.

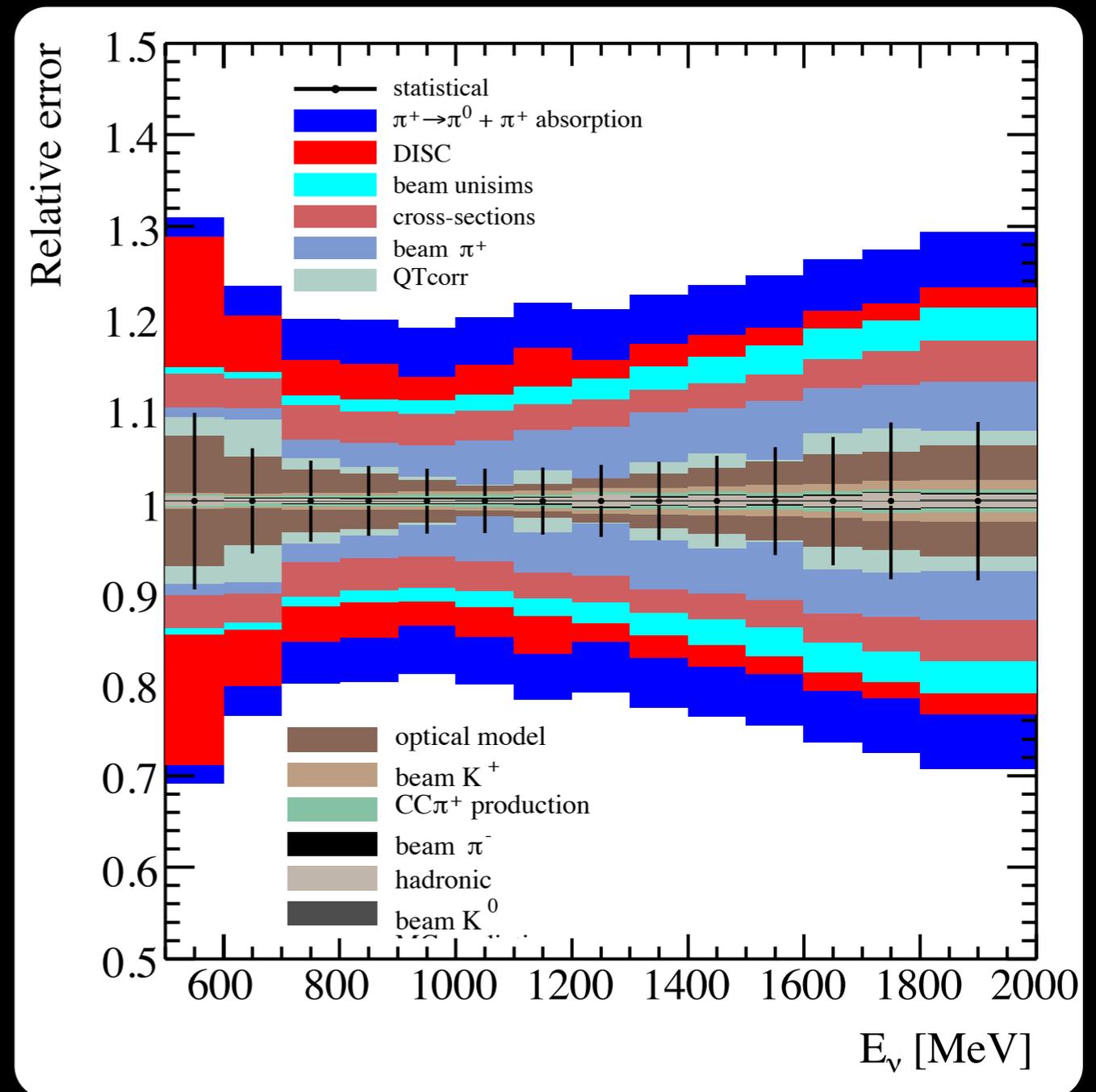
Relative errors

- What the hell happened with DISC?????????

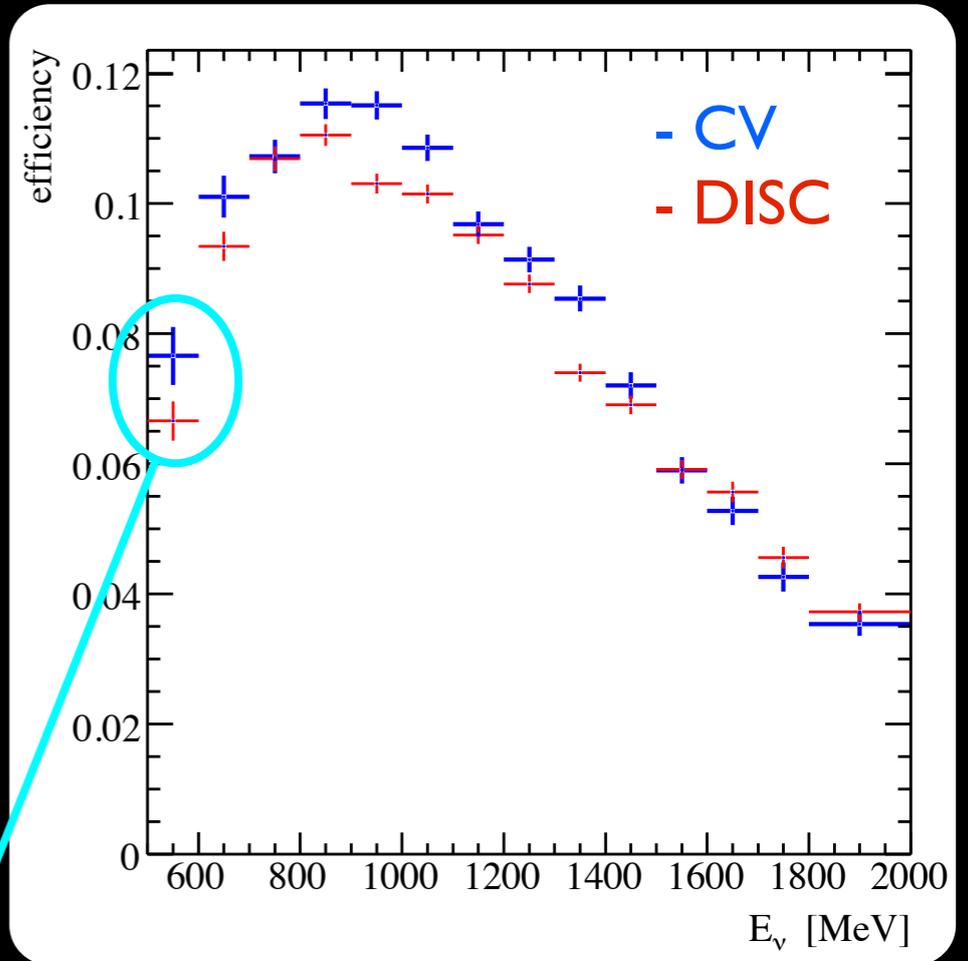
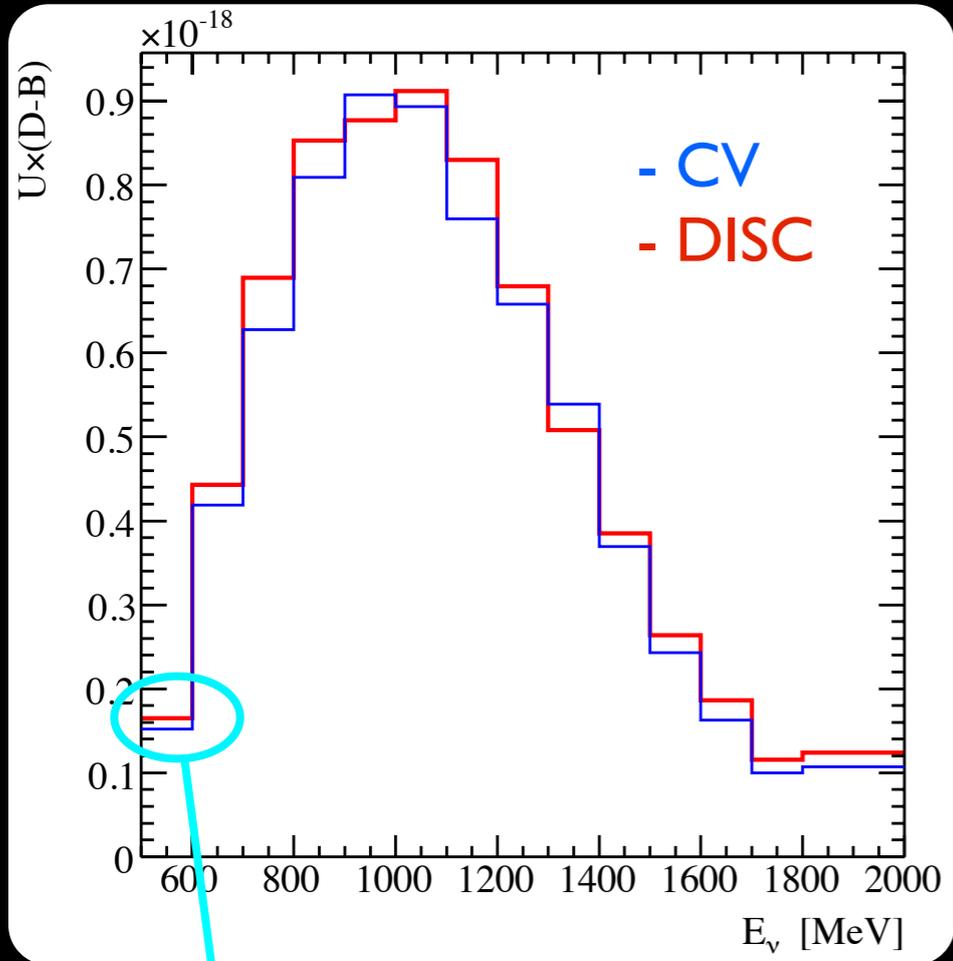


Normalization errors

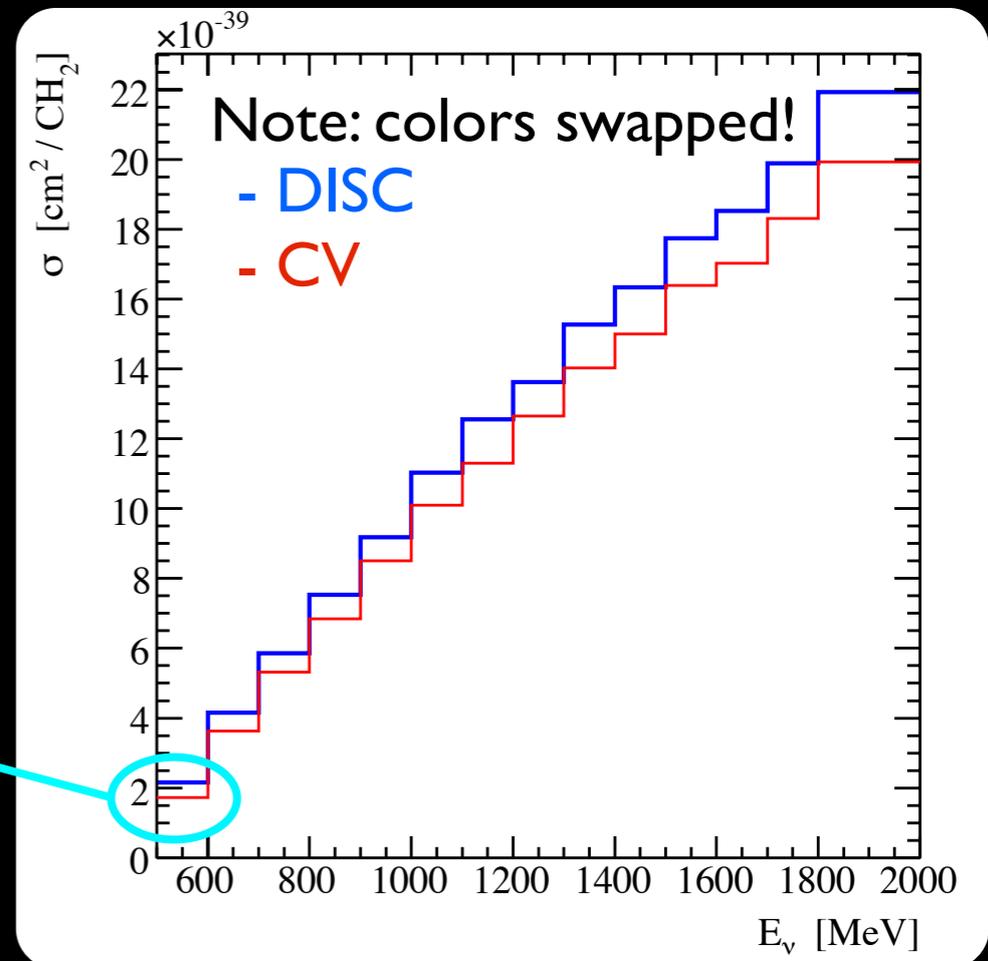
Error	Fraction
Statistical	2.97%
$\pi^+ \rightarrow \pi^0$ and π^+ absorption	15.2%
DISC	9.34%
Beam Unisims	8.61%
Cross-sections	8.25%
Beam π^+	8.11%
QT correlation	2.30%
Optical Model	2.23%
Beam K^+	1.26%
CC π^+ production	0.7%
Beam π^-	0.35%
Hadronic	0.15%
Beam K^0	0.06%
Total Systematic Error	23.18%
Total Error w/o DISC, QTcorr	21.09%



DISC

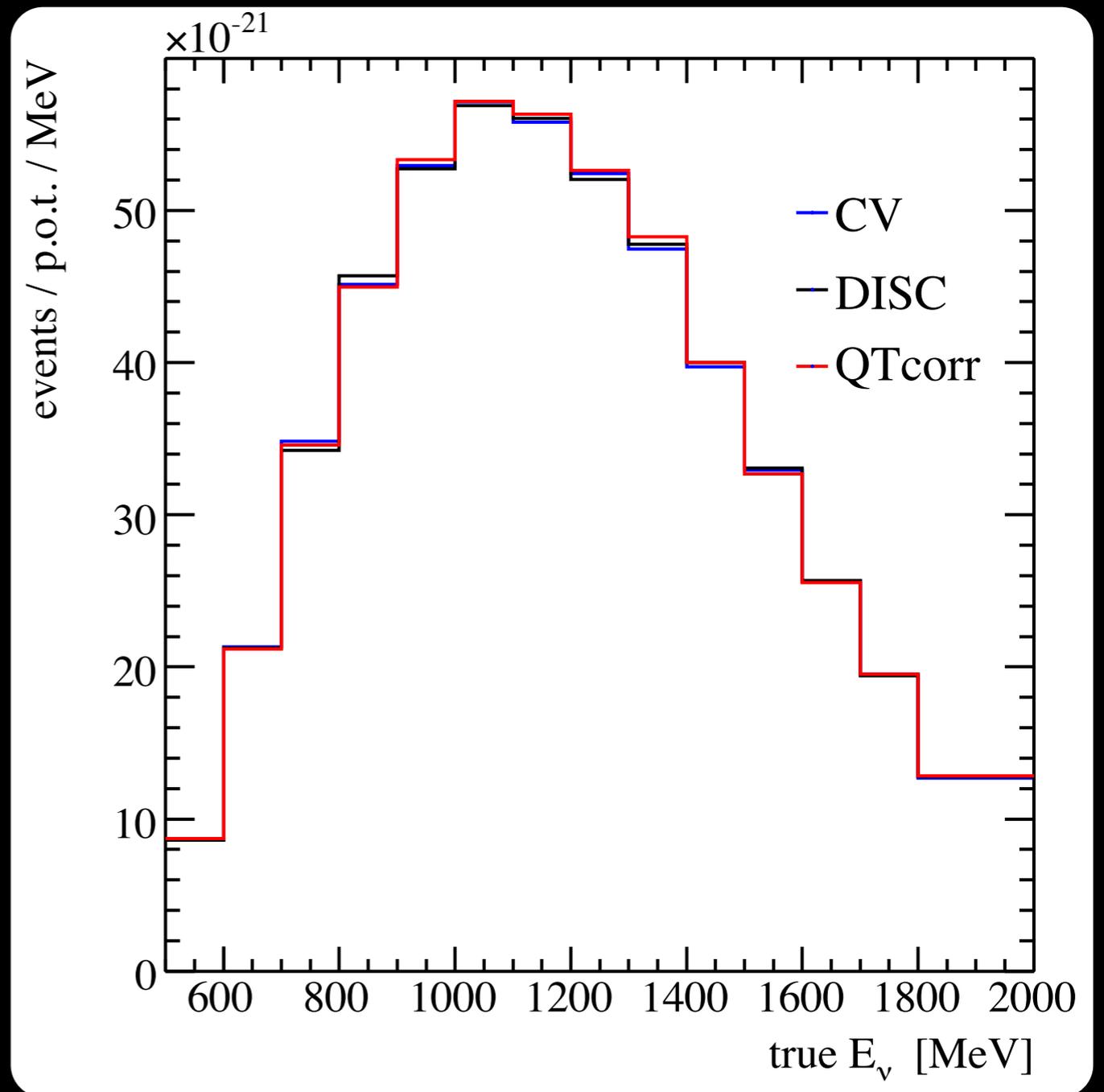


- 9% difference in the first bin after unfolding.
- 15% difference in the efficiency in the first bin.
- 25% difference in the cross-section.



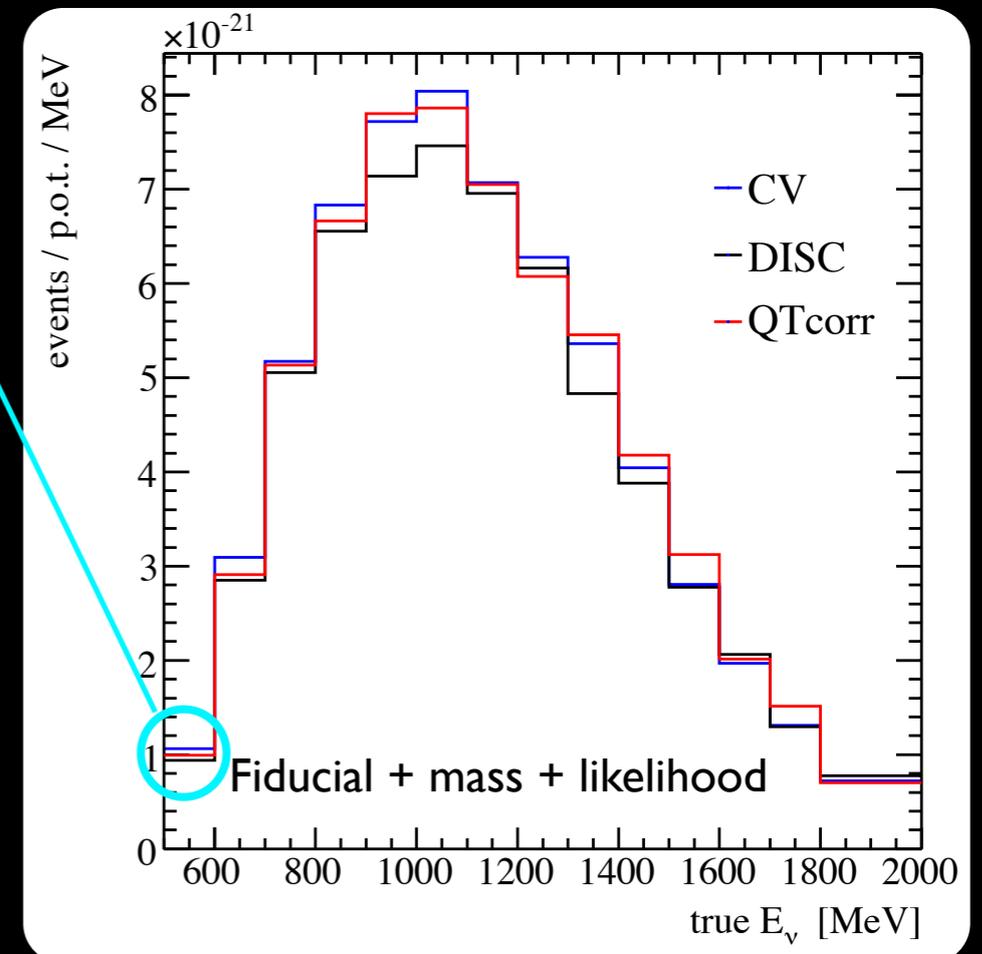
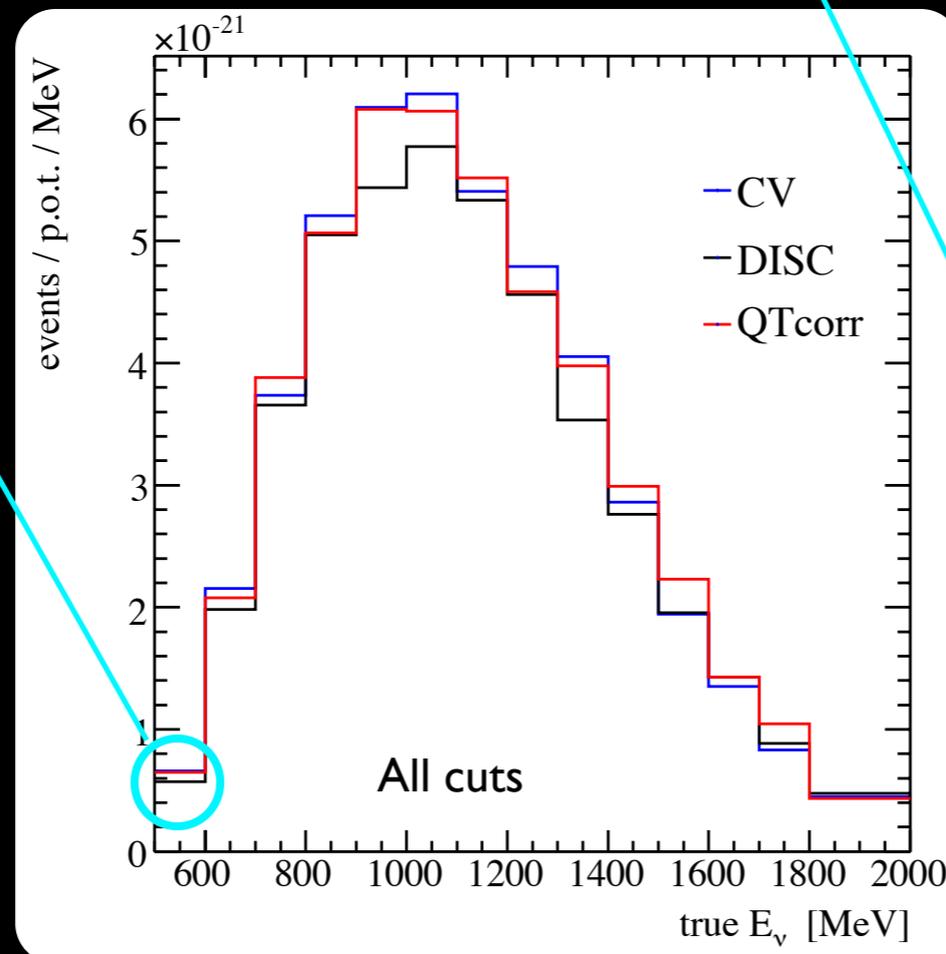
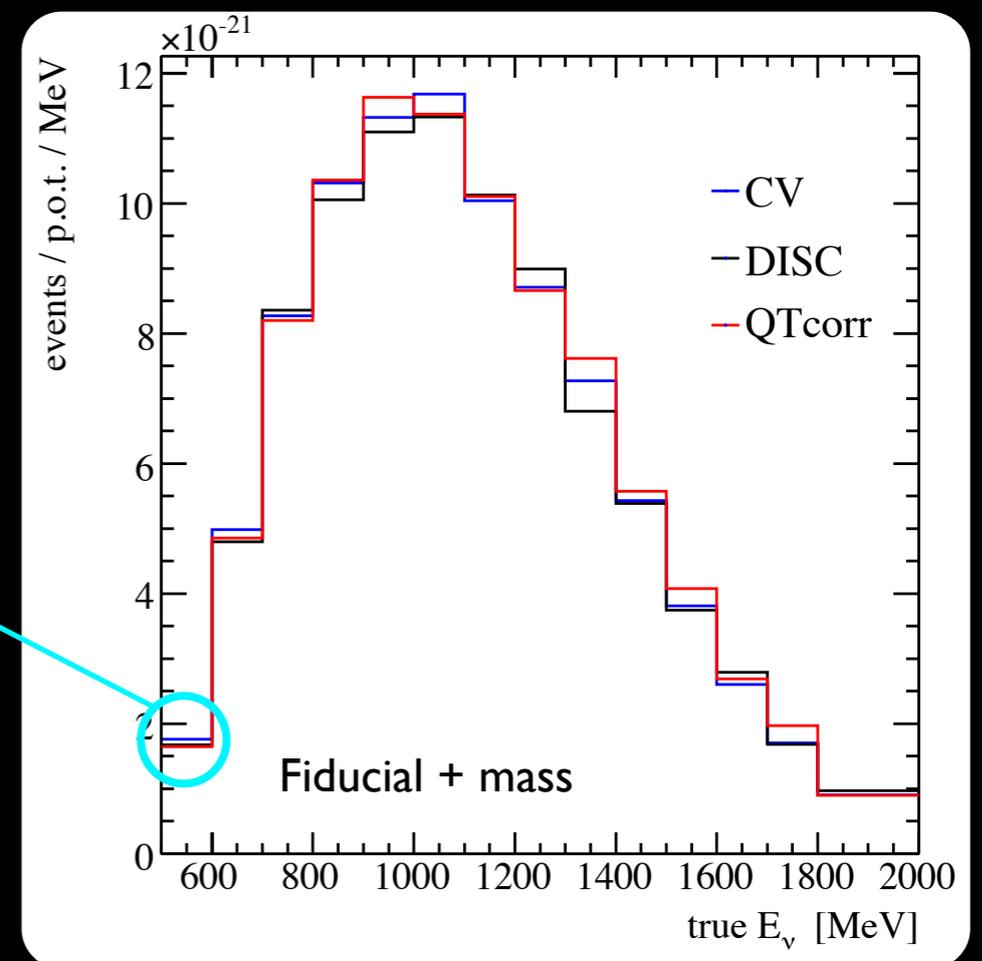
Efficiency denominator

- The efficiency denominator is within $\sim 1\%$ in all bins.
- They are all from the same underlying true distribution.



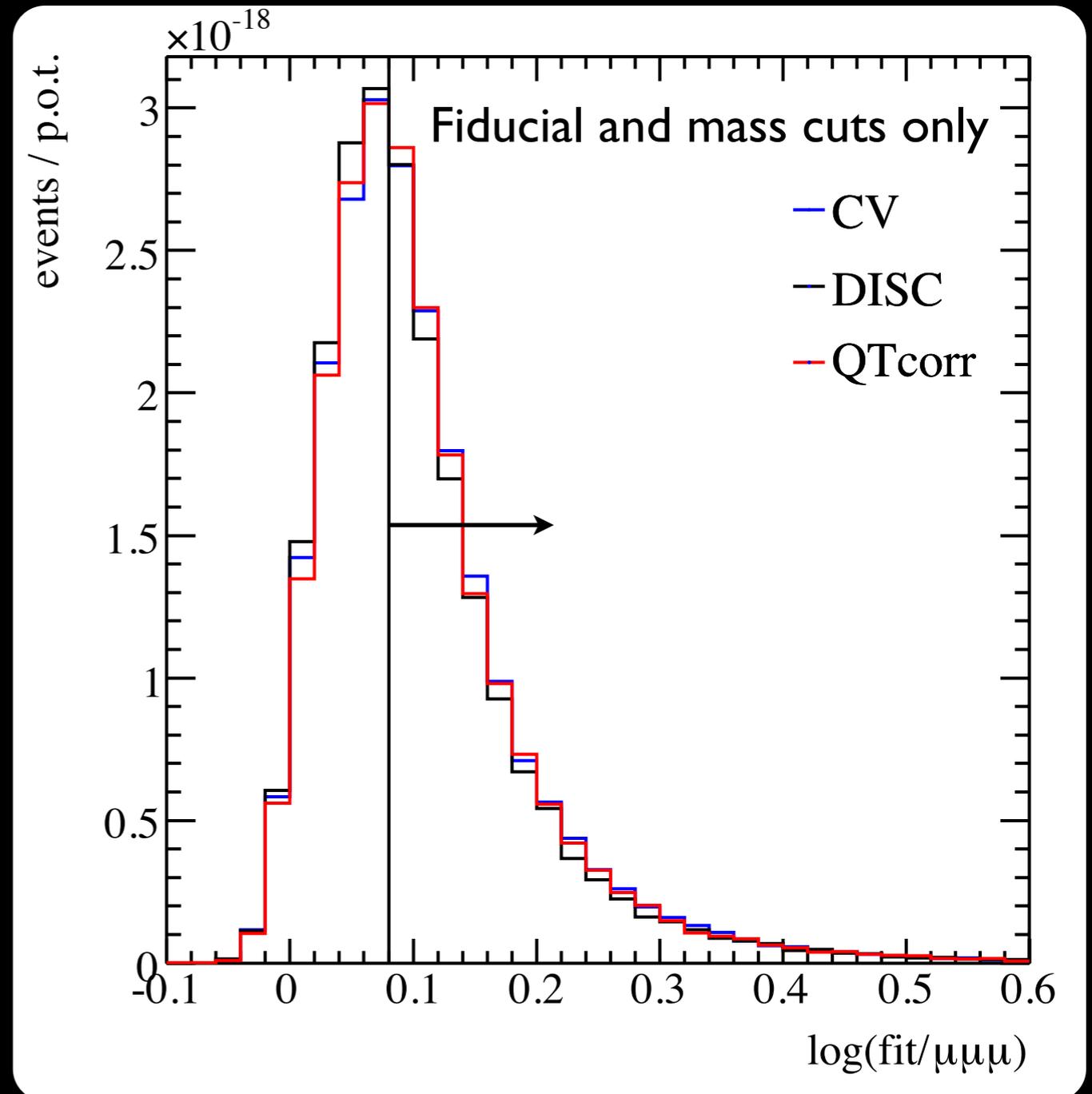
Efficiency numerators

- It's hard to see but the fiducial and mass cut have a small effect, QTcorr and DISC are identical here.
- The Likelihood cut has a 13% effect in the first bin for DISC.
- All cuts have a 15% effect in the first bin.



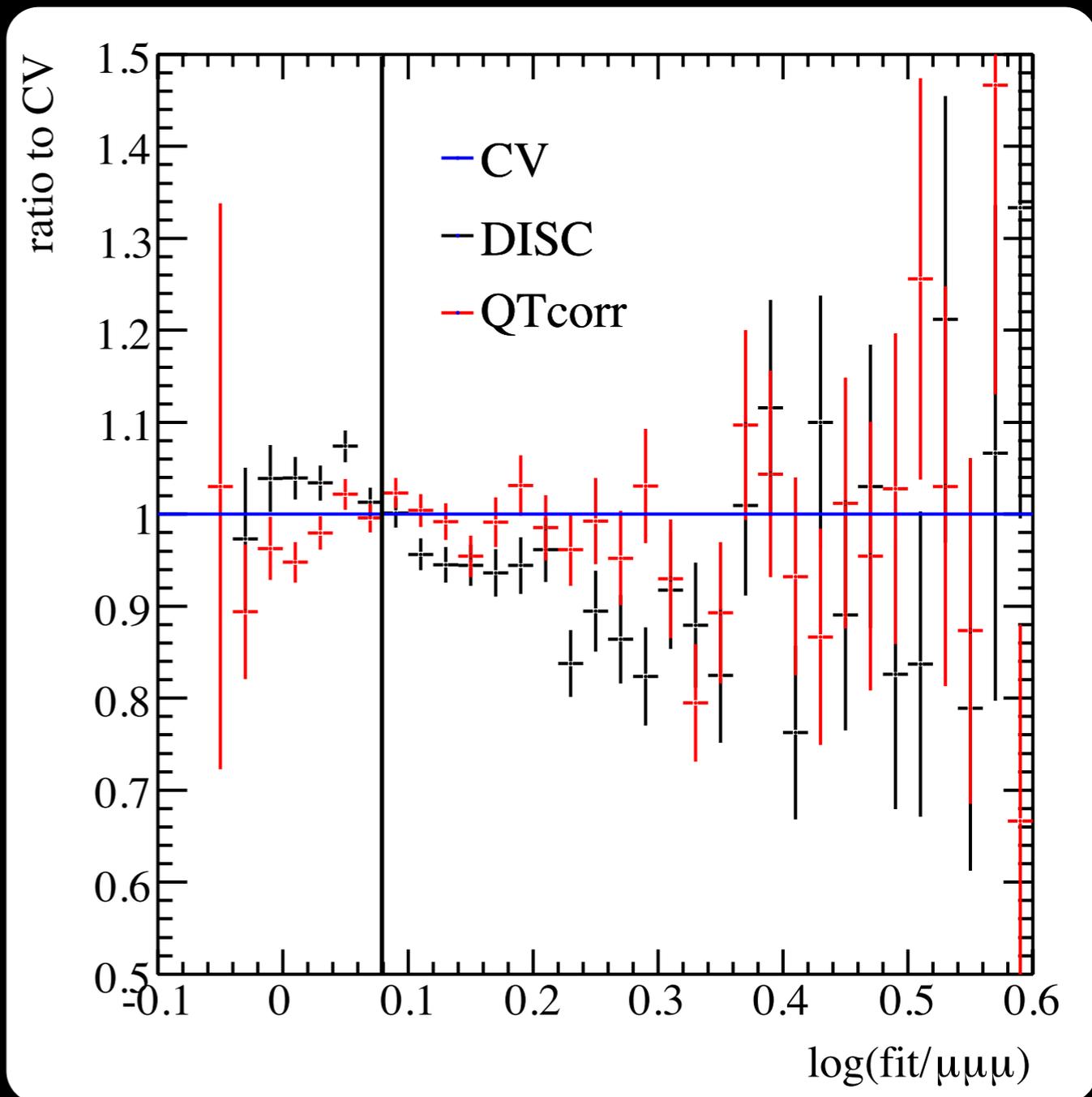
Fit likelihoods

- Also shown is the current likelihood cut.
- DISC has a slight shift toward the generic fitter (toward 0).



Likelihood ratios

- QTcorr is flatter than DISC.
- Especially in the high statistics region (between 0 and 0.3).



Thoughts

- Clearly, by blocking low charge tubes we are affecting the PID.
- Since the PID is worse at low neutrino energy, we get hit the hardest there.
- How do we handle a shift in the likelihood?
 - Adjust the cut in the unisim relative to the CV? (probably a bad idea, but see next slide anyways)
 - Optimize the cut to reduce the effect? (probably wont work)
 - Use the Michel distance likelihood instead of the fit, of some combination? (might be a good idea, since that's how we choose PID anyways)
- Other ideas?

Changing the Likelihood cut as an example of what not to do

- Shifting the likelihood cut in just the DISC unisim by one bin (to 0.07) reduces the effect significantly.....
- Still an 8% error but no longer dominates anywhere.

