# Analysis Update

Min Huang

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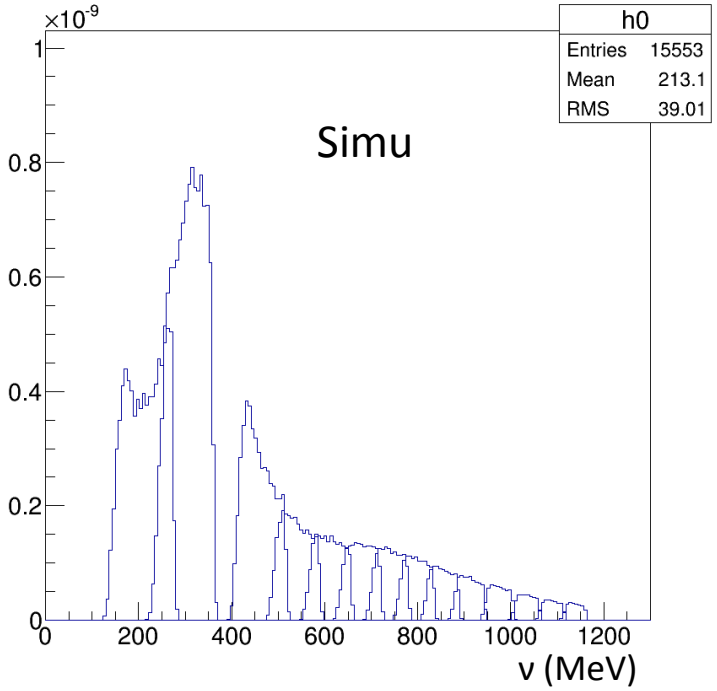
# Acceptance

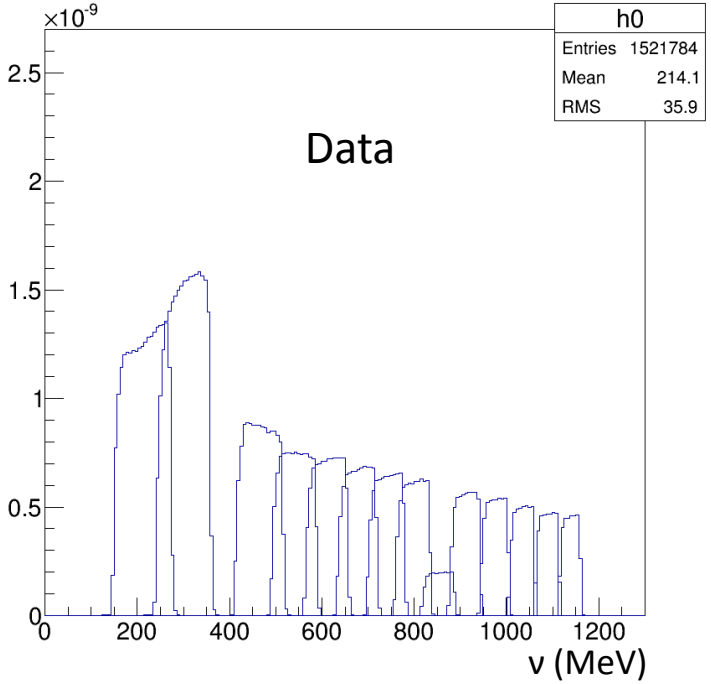
- Unpolarized cross section
- $\frac{d\sigma^{raw}}{d\Omega d\mathrm{E}'} = \frac{N \cdot ps \cdot RC}{Q/q \cdot N_{tg} LT \cdot \epsilon_{det}} \frac{1}{Acc \Delta\Omega \Delta \mathrm{E}'}$
- Use Monte-Carlo simulation to study Acc
- $\frac{1}{Acc \Delta\Omega \Delta \mathrm{E}'} = \frac{1}{\Delta\Omega^{MC} \Delta \mathrm{E}'^{MC}} \frac{N_{simu}^{MC}}{N_{acc}^{MC}}$
- Goal: match simulation to data

- 2.3 GeV, 5T longitudinal, 3rd septum setting
- 1.7 GeV, 2.5T transverse, 3rd septum setting
- Started from optics/dilution runs

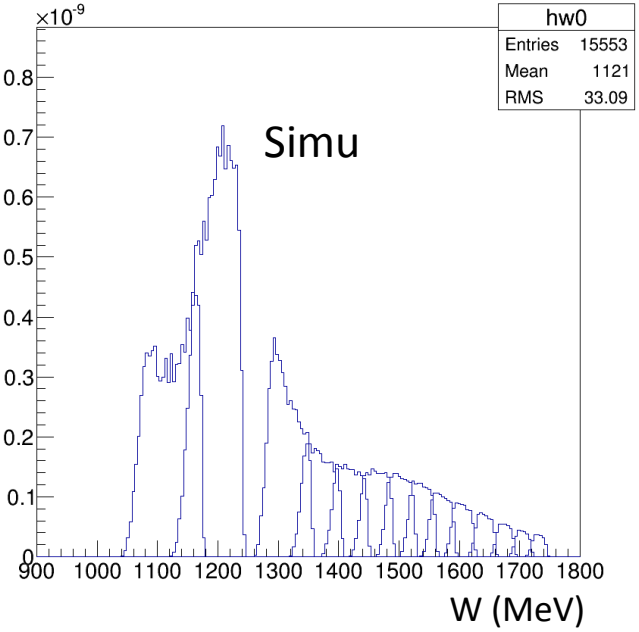
# More Correction Attempts

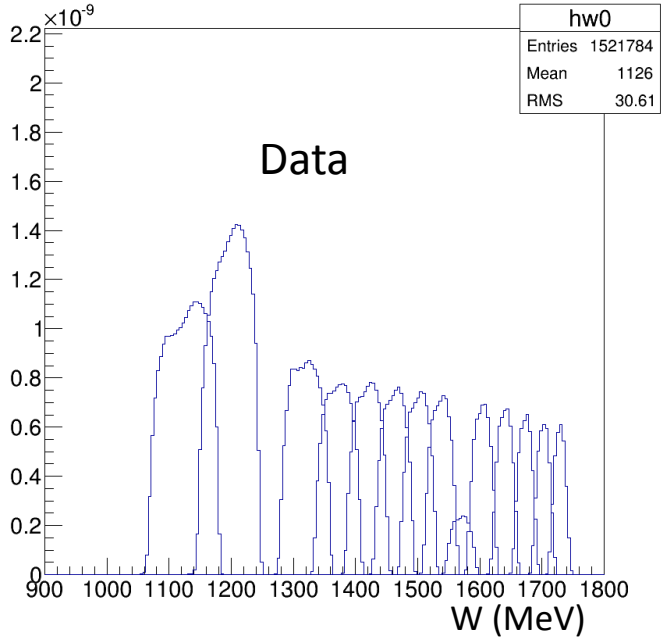
- Adjusted apertures according to optics run
- Adjusted apertures according to dilution run
- Removed Mott xs from data and compared to simulation, then tried different acceptance cuts (θ, ϕ, δ) according to dilution run to find good cuts
- First works well, the other two only work well locally around the targeted run
- If plotting out entire spectrum of yield, they don't work for every HRS $p_0$ setting
  - $Y_{data} = \frac{N \cdot ps}{Q \cdot \varepsilon_{det} \cdot LT}$
  - $Y_{simu} = N_{tg} \sum_{event} \sigma_{model}^{rad} \frac{(\Delta E' \Delta \Omega)^{gen}}{N_{gen}}$



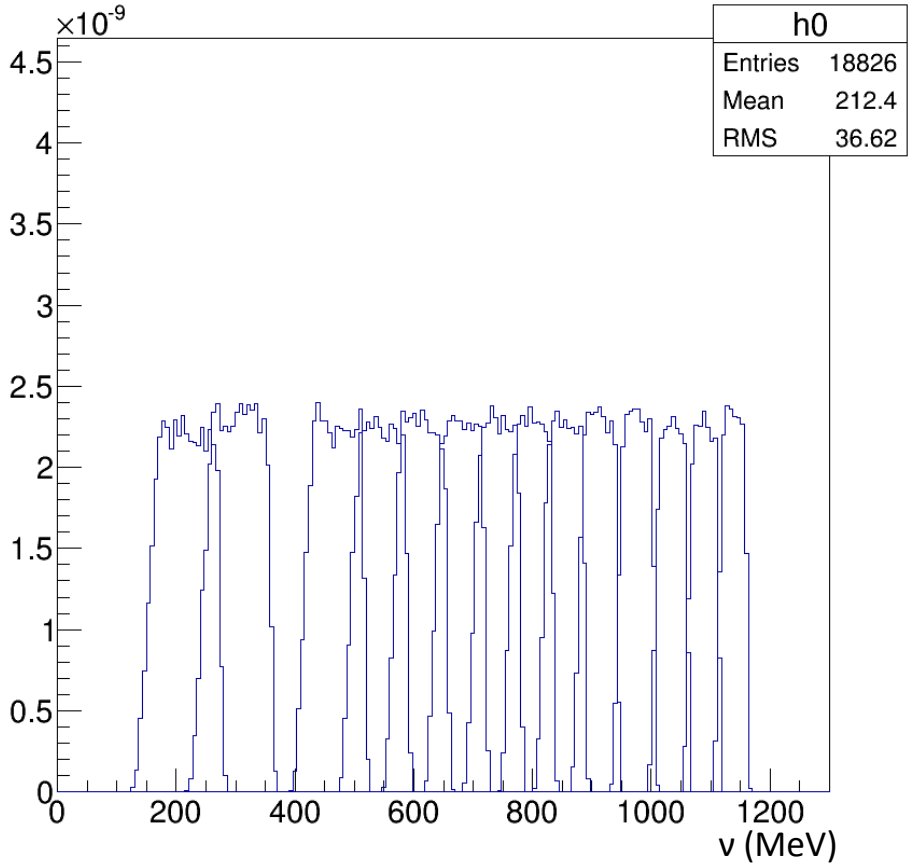




Data has angled shape, different from simu



# Acceptance




- Does it suggest that the xs model deviates from data?
- Need to find region that xs is understood better
  - No DIS data
  - Elastic?

# Next

- Optics correction for 2.3GeV, 5T long. config is almost finished (Chao)
- Go through the processes with updated data distributions from optics
- Understand the angled shape (different slopes) discrepancies
  - Compare plain simulation with data/Mott for each HRS $p_0$ setting
  - Use elastic runs to check acceptance, since xs model is understood better there
- Programs to extract acceptance and form xs are ready to use

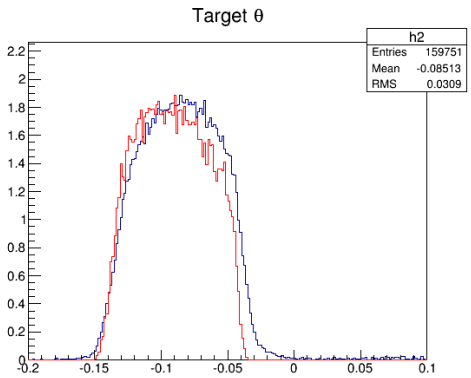
# Graduation

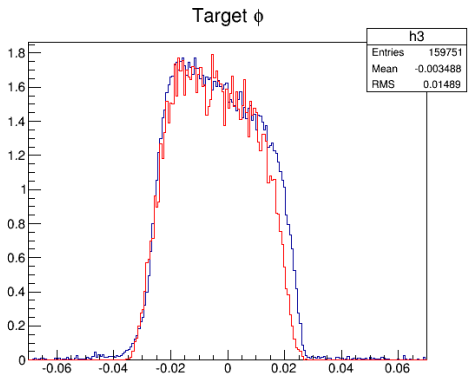
- Thesis: cross section difference for one kinematic configuration
- Possible $\sigma_{TT}$ $\sigma_{LT}$?
- Defense in January, 2016

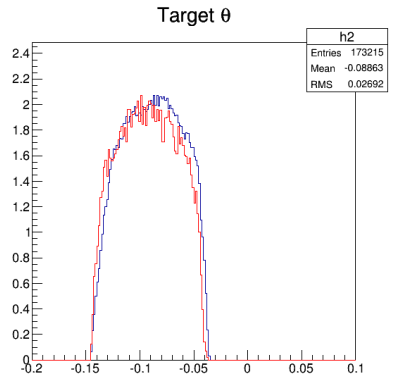
# Backup

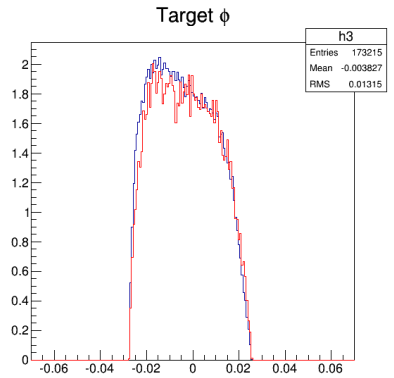
# Comparison

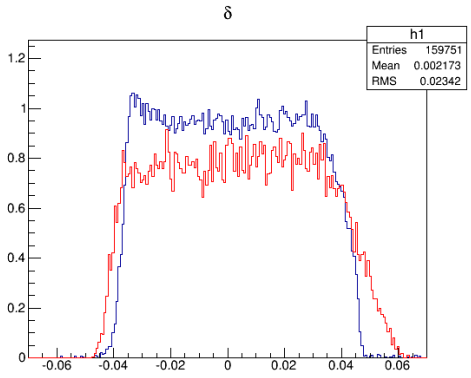
with aperture cuts

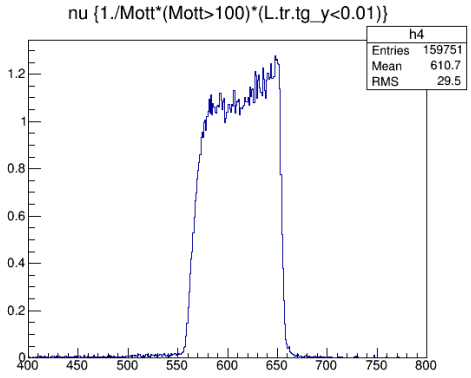


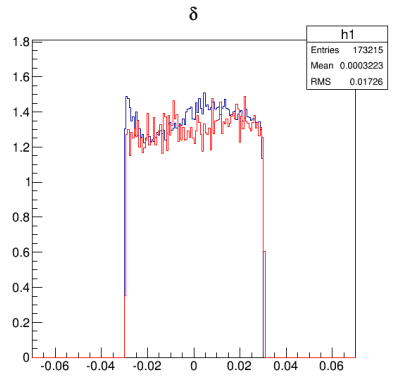



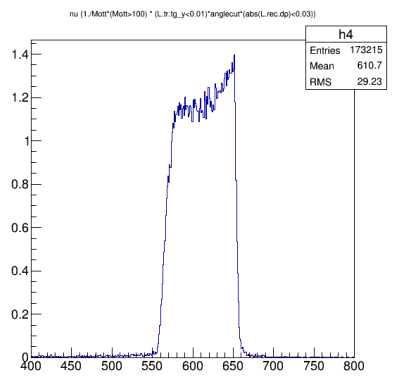



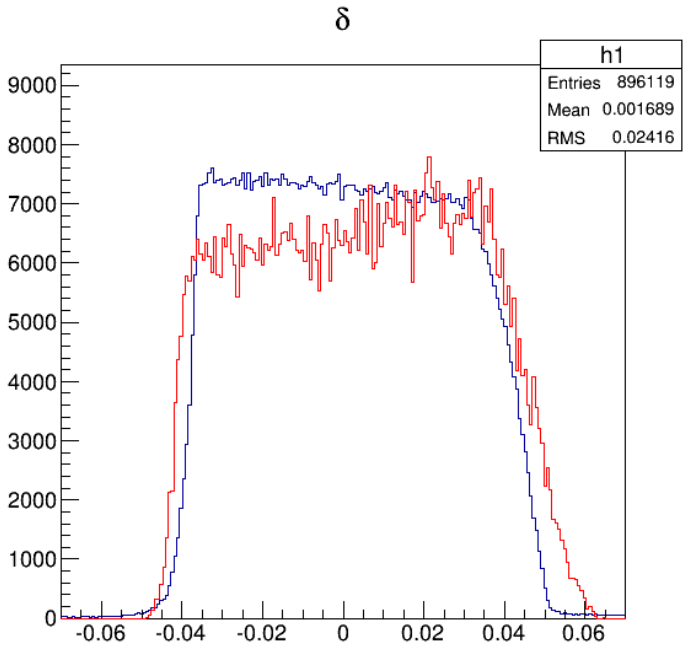



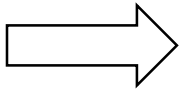



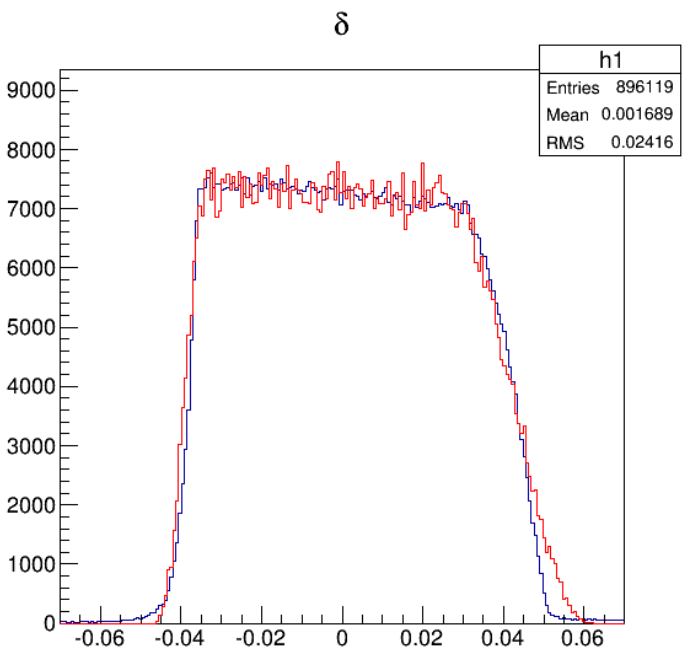



# Aperture Adjustment Atempt



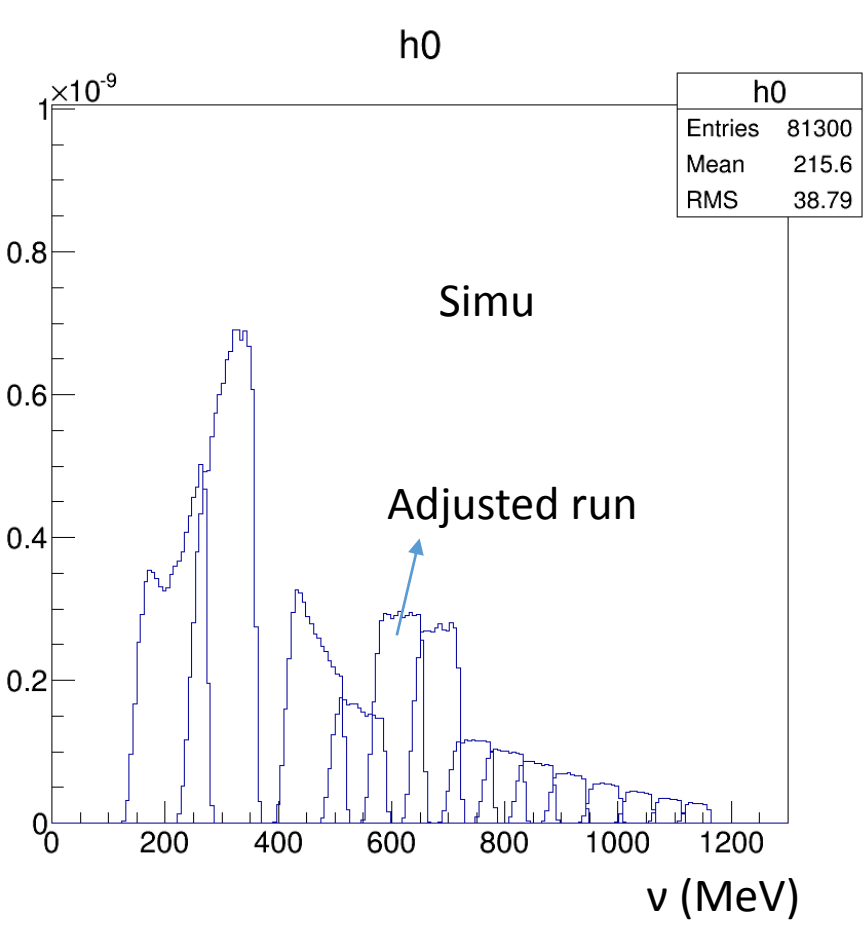


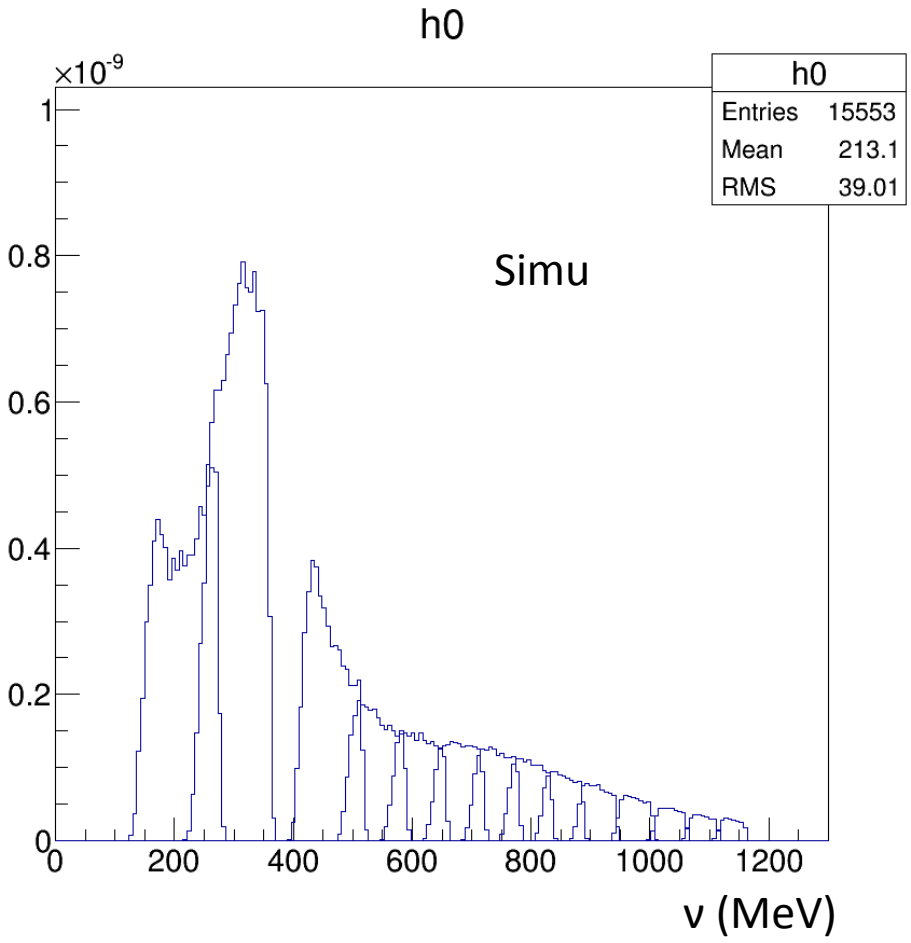

1.7 GeV, 2.5T Trans

Last time: aperture adjustments

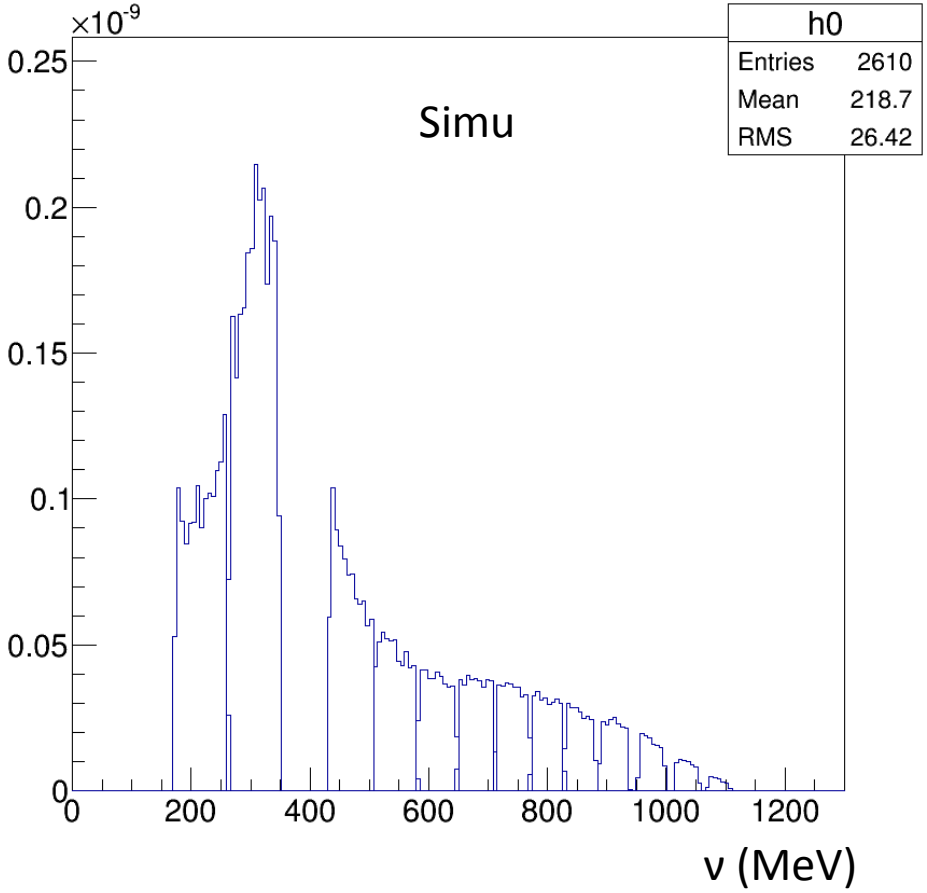
Checked other dp settings, and it seems that it doesn't work for other settings

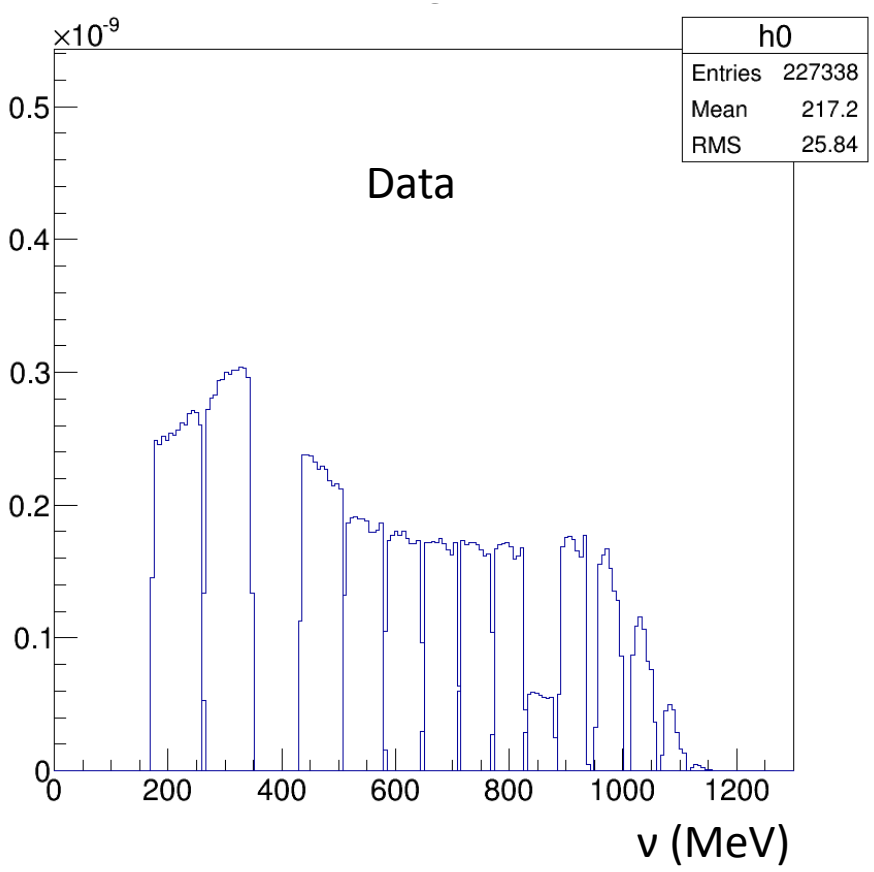
Aperture shifted



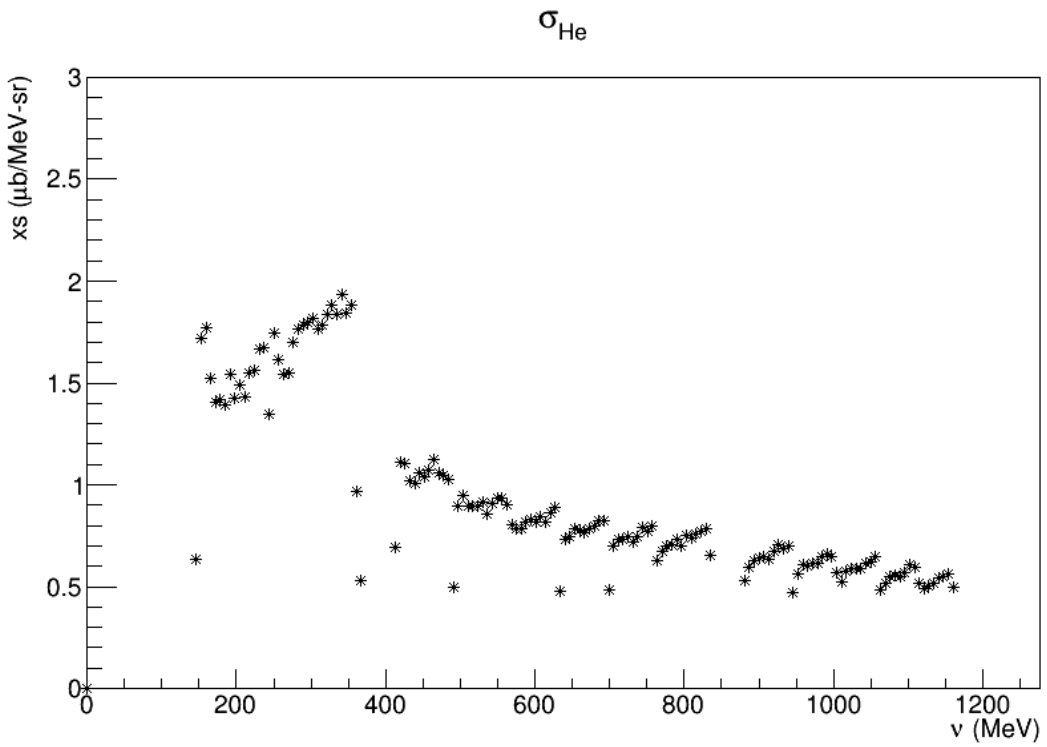
# Yields with Acceptance Cuts




θϵ(-0.12, -0.08)rad, ϕϵ(-0.02,0.02)rad, abs(δ)<0.03

# Cross Section



# Aperture Adjustments

## -- Optics Runs