Weekly Updates On nu e Meeting

POT normalization check ups

Wenting Tan

Hampton University

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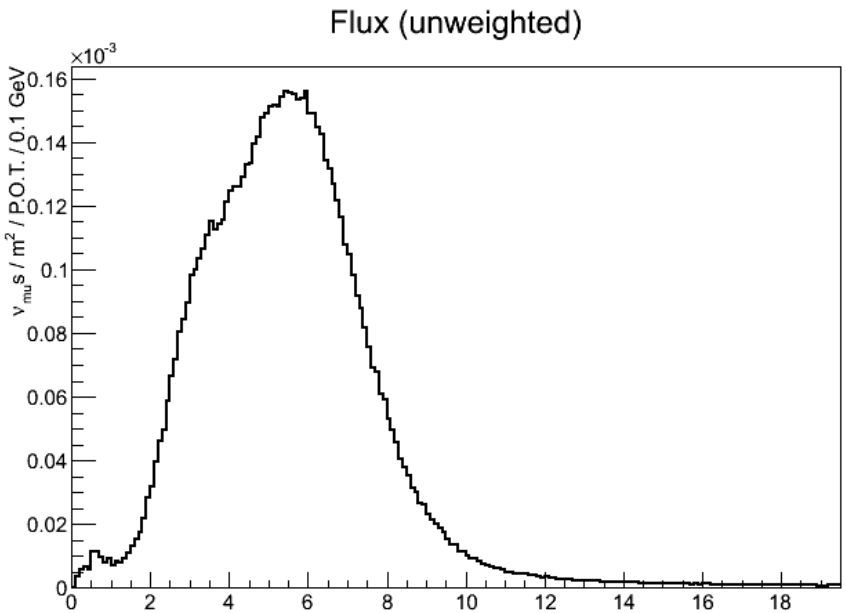
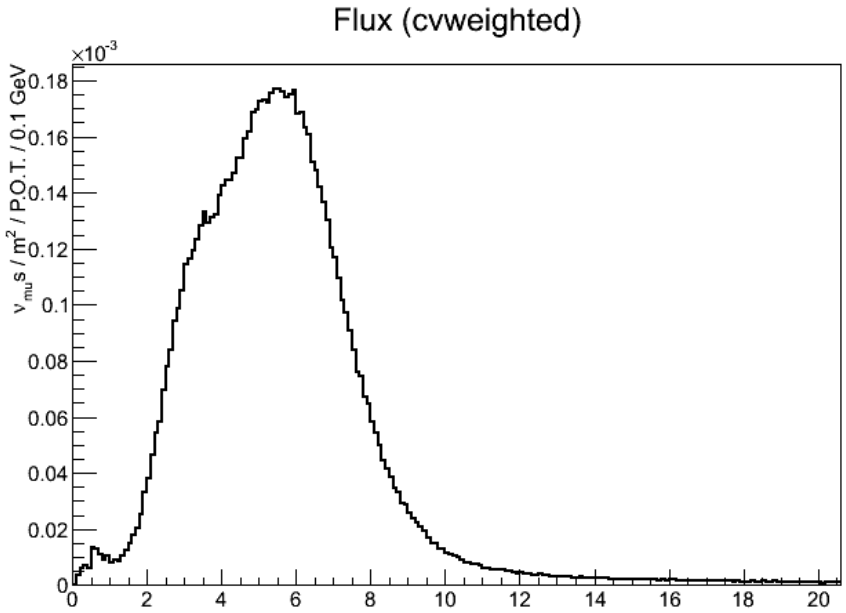
ME Flux Histograms

MINERvA Document 8253-v1





Absolute Event Rate Calculation

For 20E20 POT

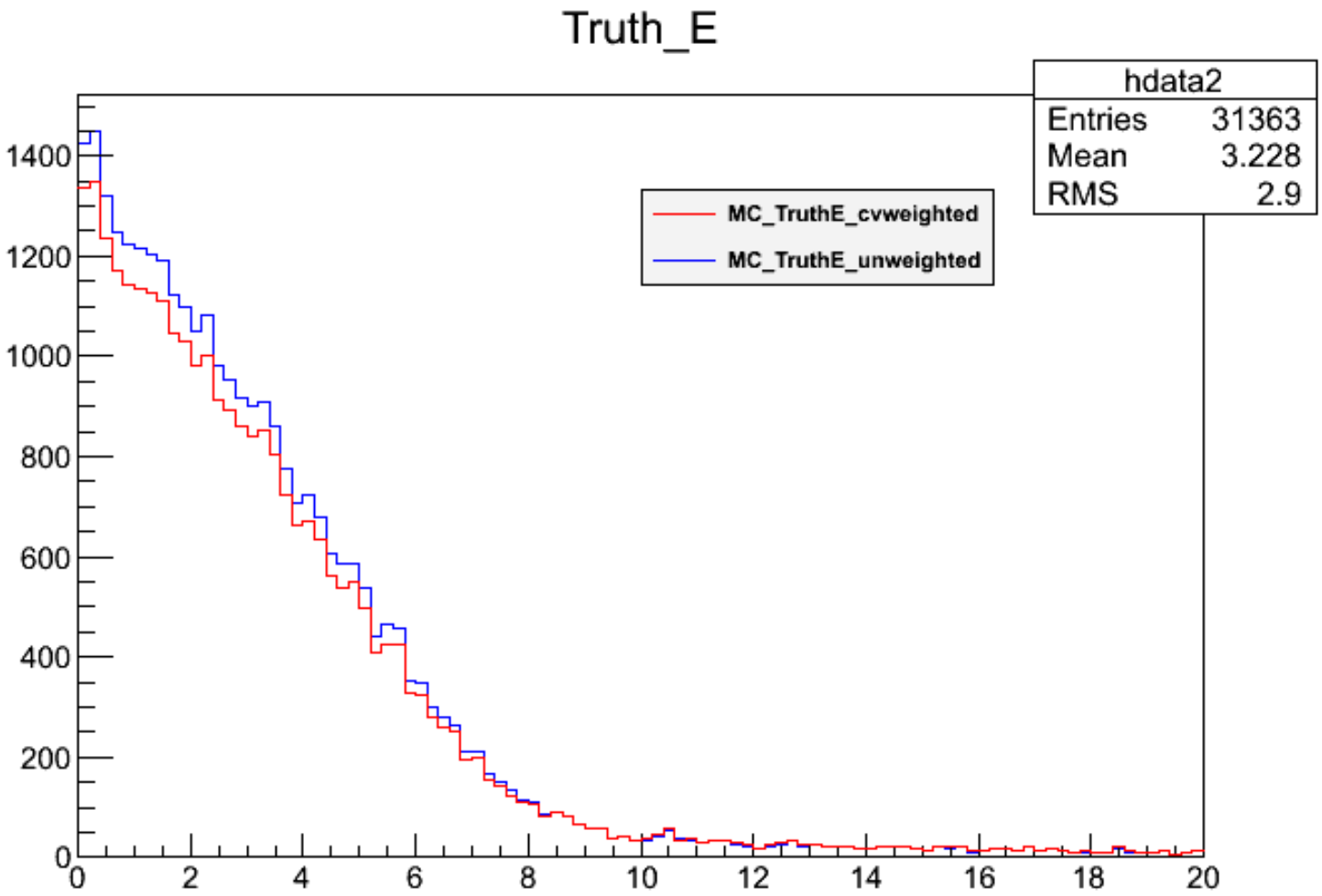
Event Rate	Theoretical	Monte Carlo
Flux cv-weighted	3056	2901
Flux un-weighted	2667	3090

- MC Event Rates are from Integral of Histograms histo_cvw and histo_unw for ν_μ, which

```
chain->Project("histo_cvw","truth_E","wgt*(truth_fiducial_evt==1&&mc_incoming==14)")

chain->Project("histo_unw","truth_E","truth_fiducial_evt==1&&mc_incoming==14")
```

Electron Energy Spectrum from flux cv-weighted and unweighted From Monte Carlo (Genie Data)



?

Need to know why cv-weighted histo integral is less than that unweighted

Electron Spectrum Predictions

arXiv:hep-ph/0603036v1 3Mar 2006

$$\frac{dN(T)}{dT} = Ne \times \int dE_\nu \frac{d\Phi(E_\nu)}{dE_\nu} \frac{d\sigma(T, E_\nu)}{dT}$$

Where

$$Ne = 1.98 \times 10^{30}$$

is the Number of available electrons in fiducial mass

$$\frac{d\sigma}{dT} = \frac{2G_\mu^2 m_e}{\pi E_\nu^2}[a^2 E_\nu^2 + b^2 (E_\nu - T)^2 - abm_e T]$$

$$m_e = 0.000511\,GeV$$

$s^2 = \sin^2\theta_w \approx 0.23149 \pm 0.00015$ *for* ν_μ, $a = 1/2 - s^2$; $b = -s^2$

$G_\mu = 1.16637(1) \times 10^{-5}\,GeV^{-2}$, and
$\frac{2G_\mu^2 m_e}{\pi} = 1.5 \times 10^{-41}\,GeV^{-1}cm^2$

$$\frac{dN(T)}{dT} = Ne \times \int dE_\nu \frac{d\Phi(E_\nu)}{dE_\nu} \frac{d\sigma(T, E_\nu)}{dT}$$

for the discrete case(per P.O.T):

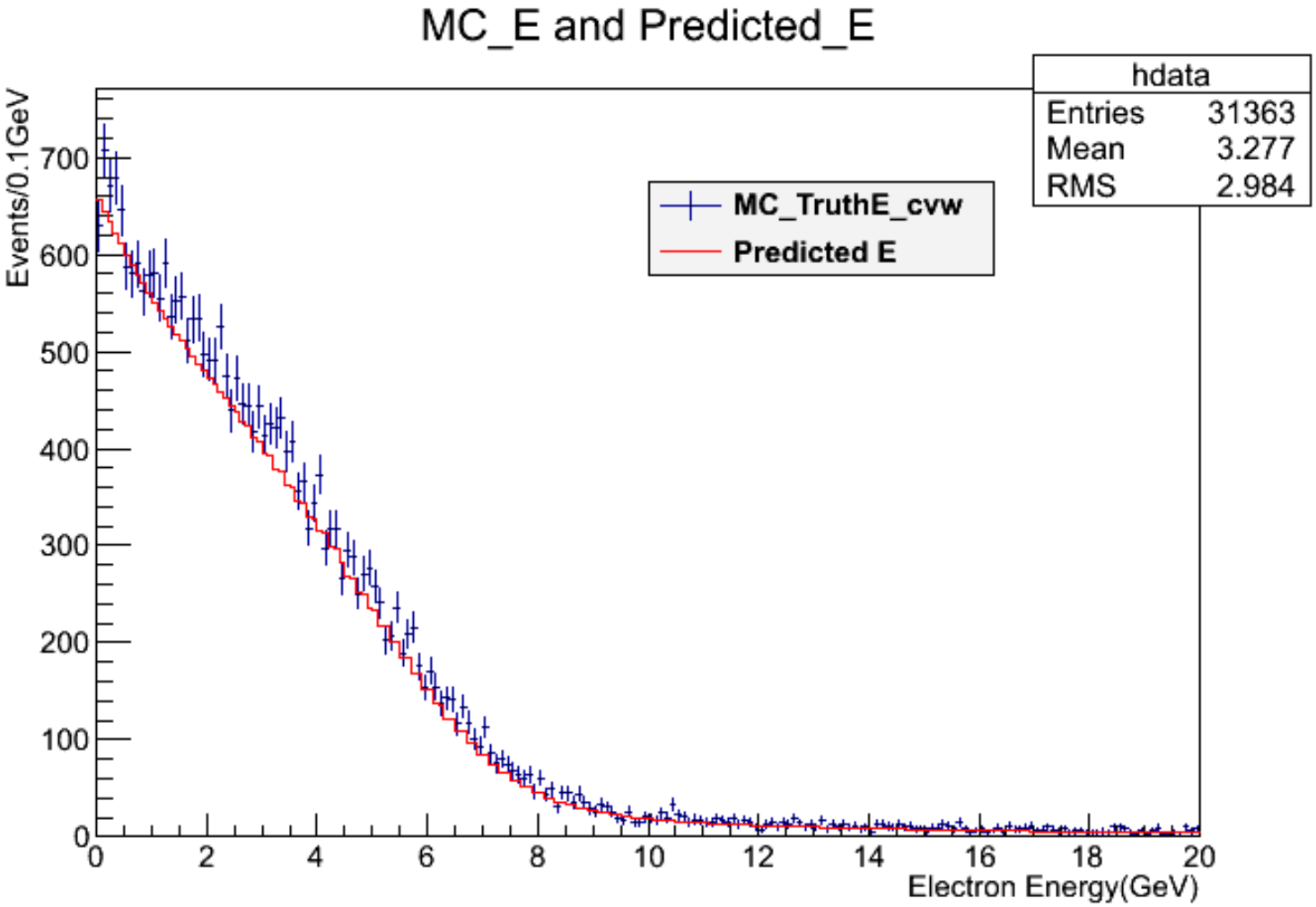
$\frac{\Delta N}{\Delta T} = Ne \times \sum \Delta E_\nu(GeV) \frac{\Phi_{bin}(/m^2/P.O.T/GeV)}{\Delta E_\nu(GeV)} \times \frac{2G_\mu^2 m_e}{\pi}(GeV^{-1} \times 10^{-4} m^2) \times \frac{1}{E_\nu^2(GeV^2)}[a^2 E_\nu^2 + b^2 (E_\nu - T)^2 - abm_e T](GeV^2)$

For 20E20 POT, Ke and flux histograms, binsize=0.1GeV, bin from 0-1000(0-100 GeV),

$$N_{bin}(/0.1\,GeV) = 20 \times 10^{20}(P.O.T) \times 0.1(GeV) \times \frac{\Delta N}{\Delta T}$$

Electron Spectrum Predictions

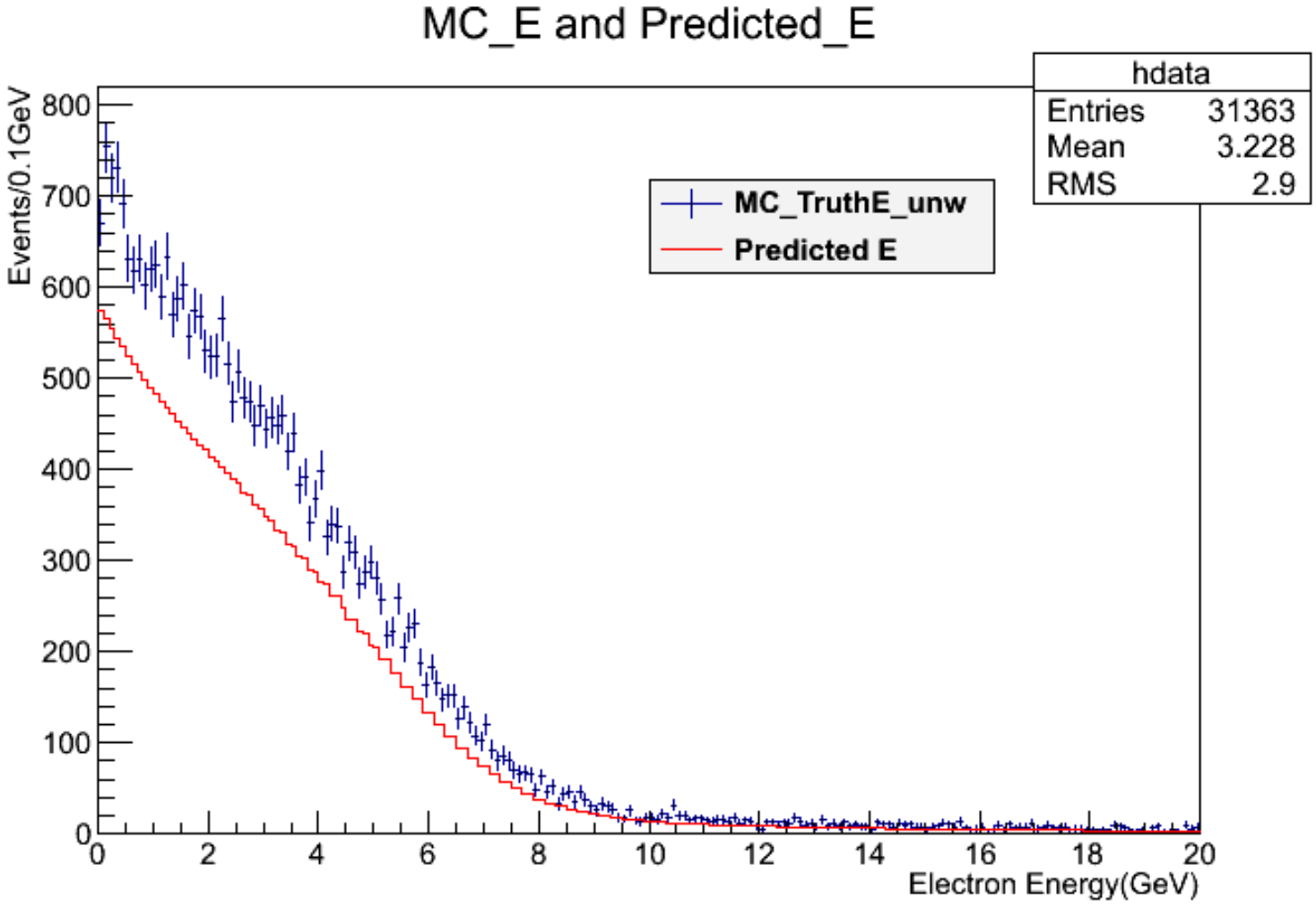
cv-weighted flux, POT normalization



Binsize -0.1GeV

Electron Spectrum Predictions

unweighted flux, POT normalization



Binsize-0.1GeV

Not consistant. Should be the same reason as the Event Rates on Page 3.