

eDIS

The cross sections for neutral- and charged-current deep inelastic scattering on unpolarized nucleons can be written in terms of the structure functions in the generic form

$$\frac{d^2\sigma^i}{dxdy} = \frac{4\pi\alpha^2}{xyQ^2} \eta^i \left\{ \left(1 - y - \frac{x^2y^2M^2}{Q^2}\right) F_2^i + y^2 x F_1^i \mp \left(y - \frac{y^2}{2}\right) x F_3^i \right\}, \tag{18.8}$$

where $i = \text{NC, CC}$ corresponds to neutral-current ($eN \rightarrow eX$) or charged-current ($eN \rightarrow \nu X$ or $\nu N \rightarrow eX$) processes, respectively. For incoming neutrinos, $L_{\mu\nu}^W$ of Eq. (18.3) is still true, but with e, λ corresponding to the outgoing charged lepton. In the last term of Eq. (18.8), the $-$ sign is taken for an incoming e^+ or $\bar{\nu}$ and the $+$ sign for an incoming e^- or ν . The factor $\eta^{\text{NC}} = 1$ for unpolarized $e^\pm$ beams, whereas*

$$y = \frac{E}{\left(M * \frac{x}{2.0} + E\right)} = \frac{E}{M * \frac{Q^2}{2M\nu} * \frac{1}{2} + E} = \frac{E}{\frac{4EE' \sin^2 \frac{\theta}{2}}{4\nu} + E} =$$

$$\frac{\nu}{E' \sin^2 \frac{\theta}{2} + \nu} = \frac{\nu}{E' \sin^2 \frac{\theta}{2} + E - E'} = \frac{\nu}{E - E' \left(1 - \sin^2 \frac{\theta}{2}\right)} \neq \frac{\nu}{E}$$

$x \in (0,1), y \in (0, \frac{E}{\left(M * \frac{x}{2.0} + E\right)})$

$$\frac{d^2\sigma}{dxdE'} = \frac{1}{E} \frac{d^2\sigma}{dxdy}$$

$$\dot{N} = \sigma * \mathcal{L} = \frac{d^2\sigma}{dxdy d\varphi} 2\pi * x * y * \mathcal{L}$$

Solid inclusive e

$$F1=Z*F1p + (A-Z)*F1n;$$

$$F2=Z*F2p + (A-Z)*F2n;$$

The $W < 3$ GeV Peter Bosted fit ($Q^2 < 11$ (GeV/C)²)

The $W > 3$ GeV world PDF sets

$$\frac{d^2\sigma}{dE'd\Omega} = \sigma_{Mott} \left[\frac{1}{\nu} F_2(x, Q^2) + \frac{2}{M} F_1(x, Q^2) \tan^2 \frac{\theta}{2} \right]$$

$$\sigma_{Mott} = \frac{4a^2 E'^2}{Q^4} \cos^2 \frac{\theta}{2}$$

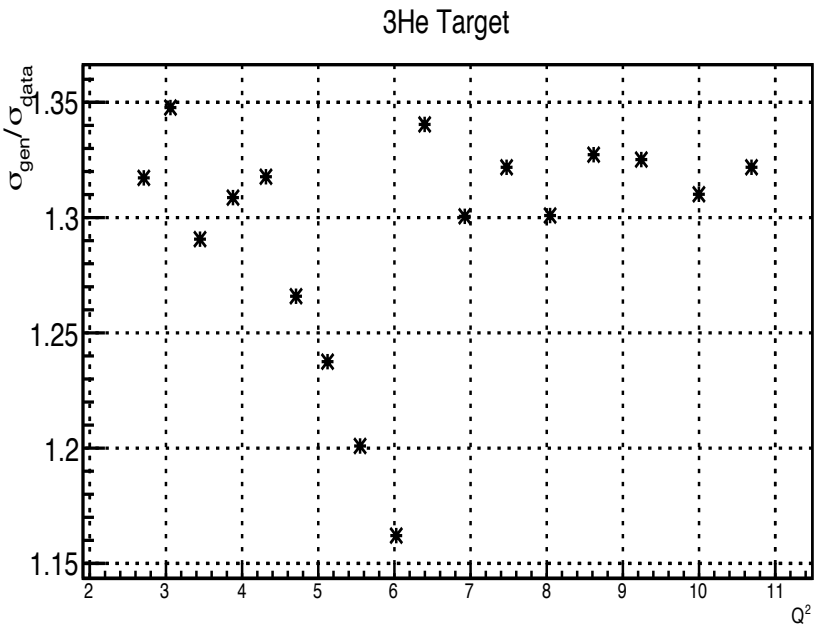
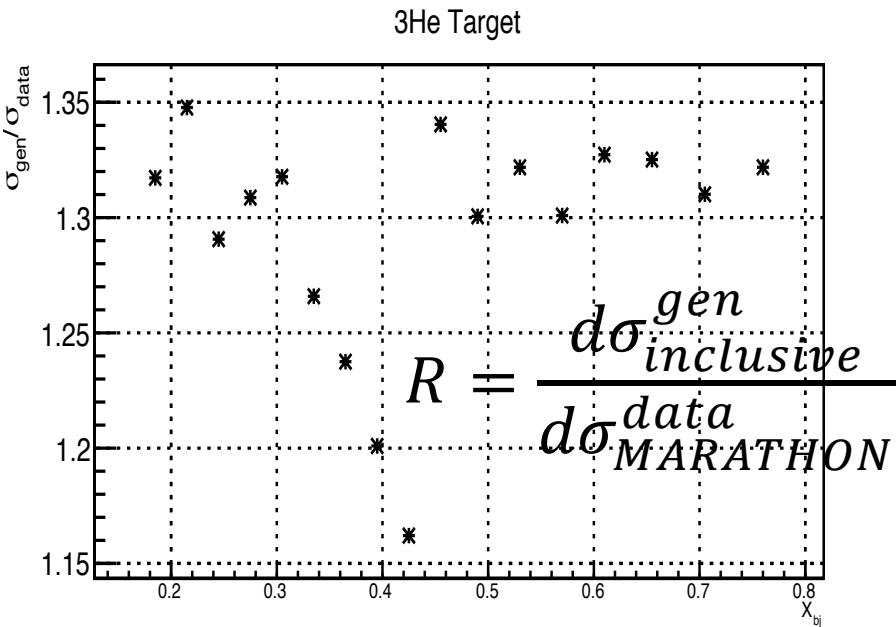
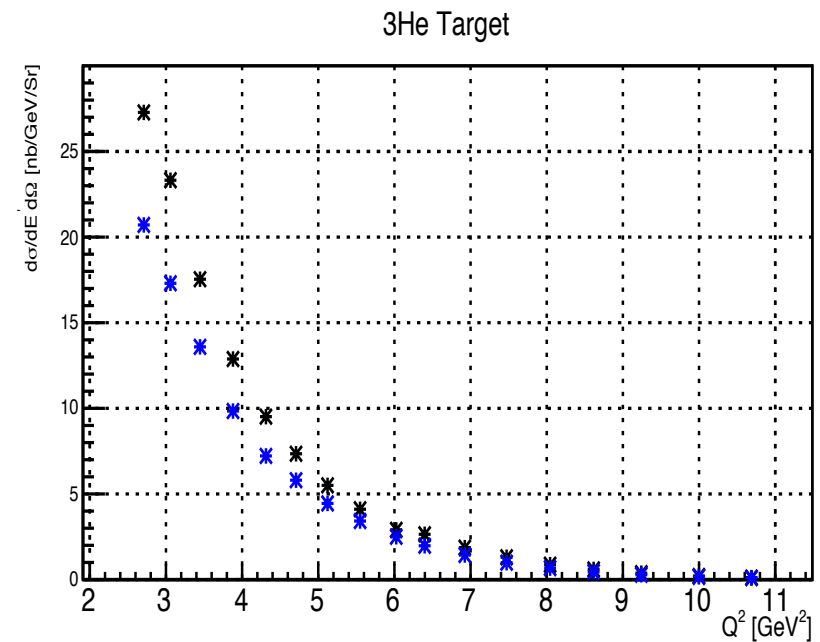
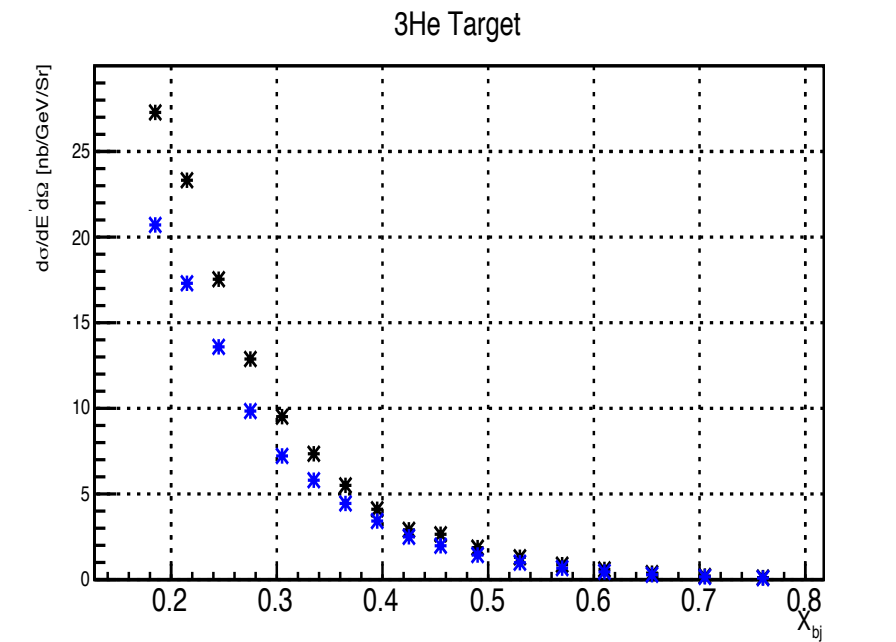
$$F_{1g} = F_{2g} \frac{(1 + \gamma^2)}{2x(1 + R)}$$

F2g from parton model

$$F_{1g} = F_{2g} \frac{1}{2x}$$

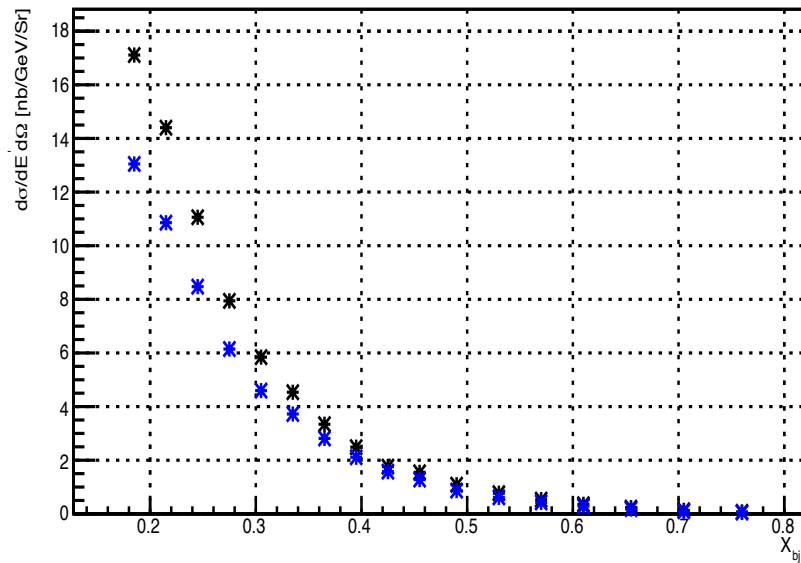
$$\dot{N} = \sigma * \mathcal{L} = \frac{d^2\sigma}{dE'd\Omega} dE' * d\Omega * \mathcal{L}$$

Differential Cross Section Comparison with MARATHON ³He target

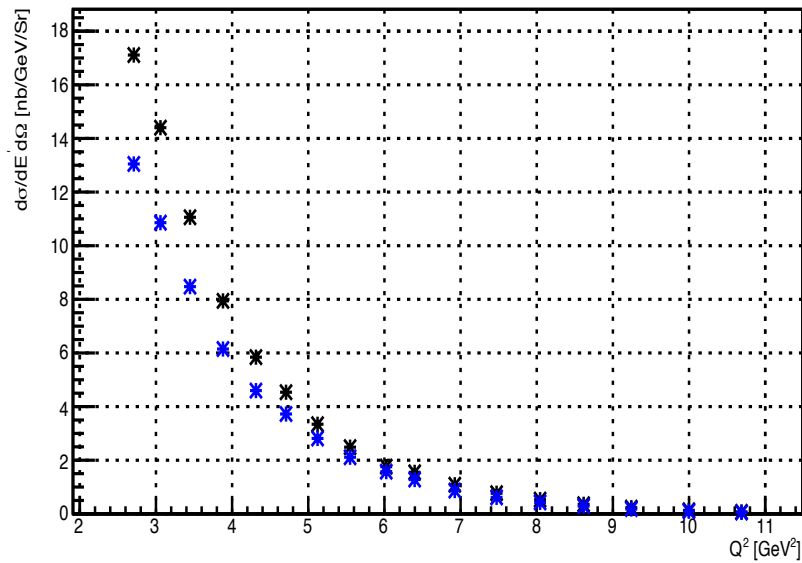


Differential Cross Section Comparison with MARATHON D_2 target

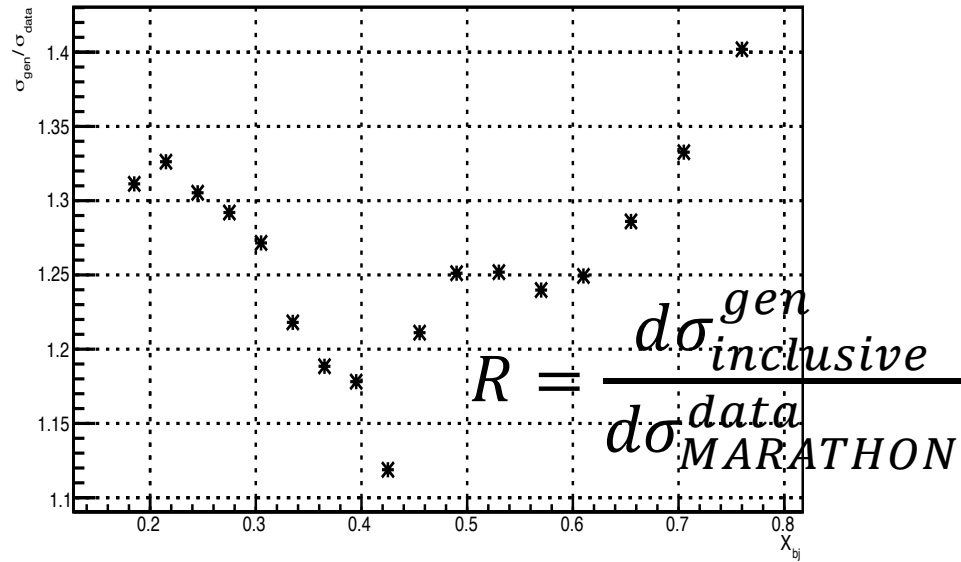
D2 Target



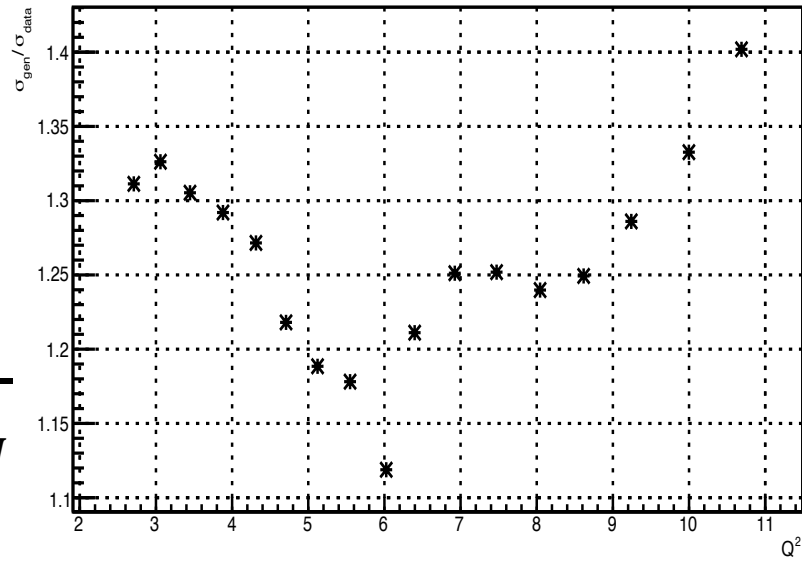
D2 Target



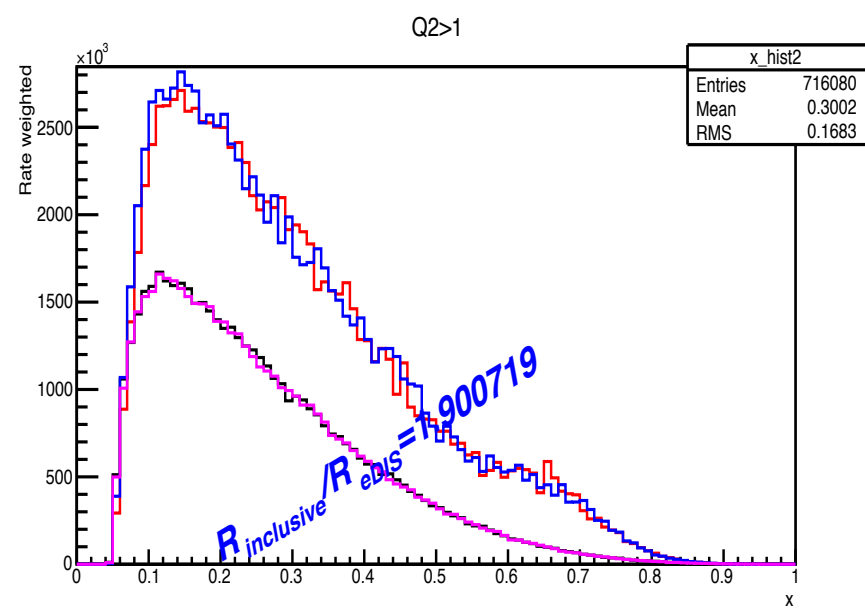
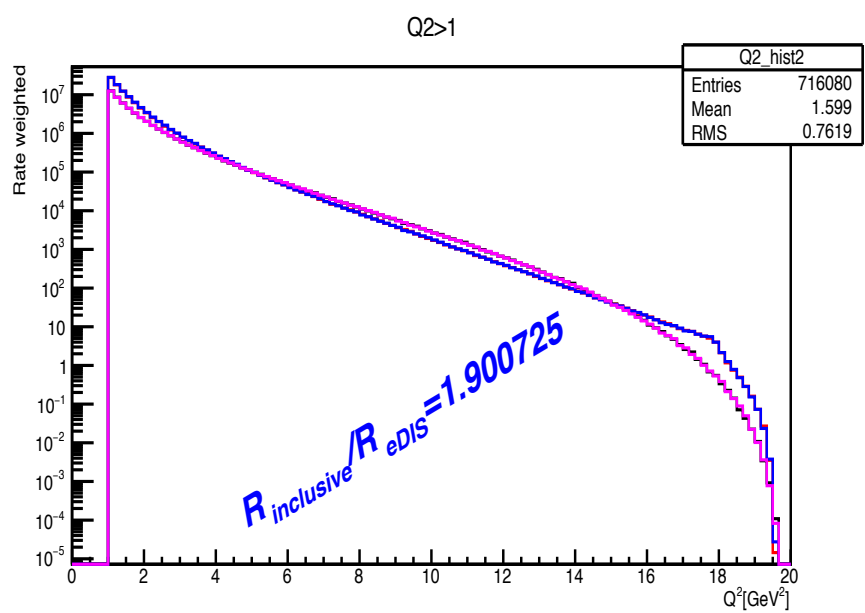
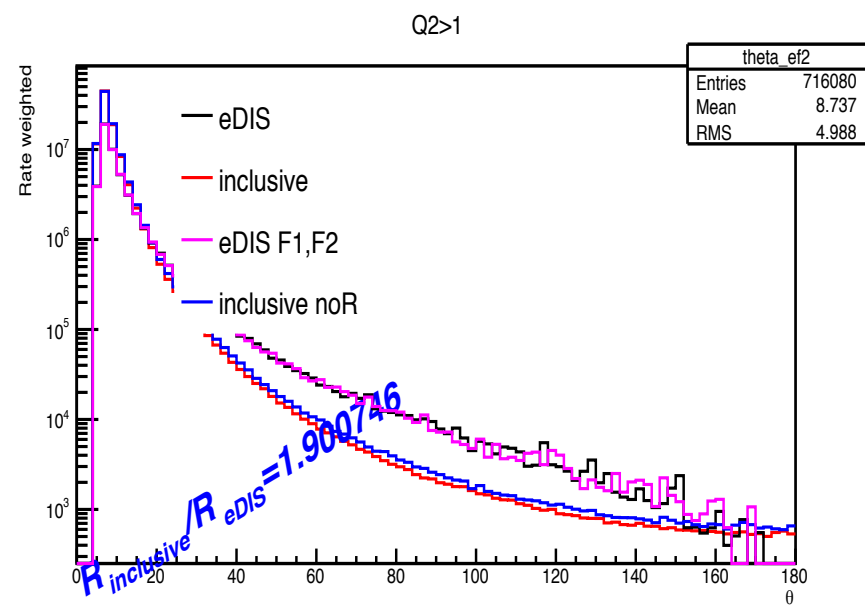
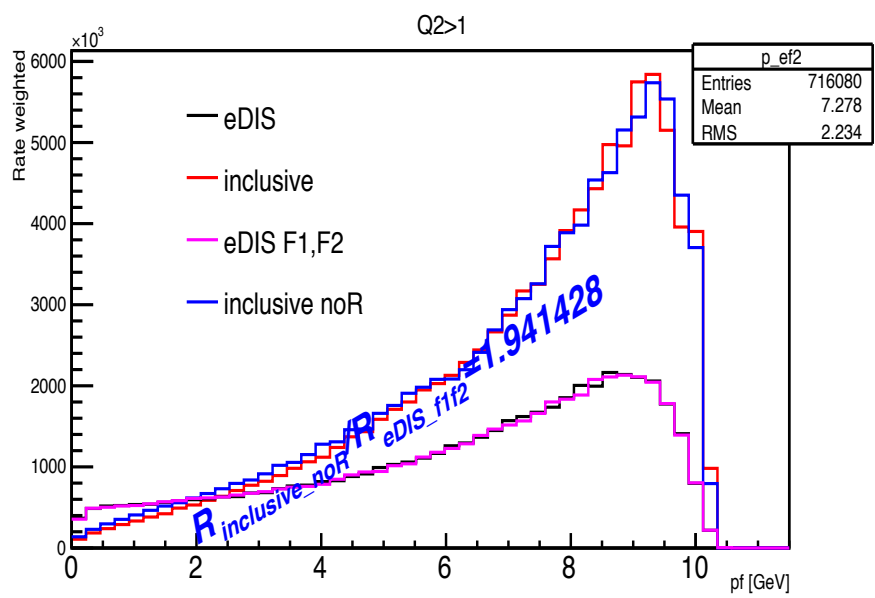
D2 Target



D2 Target



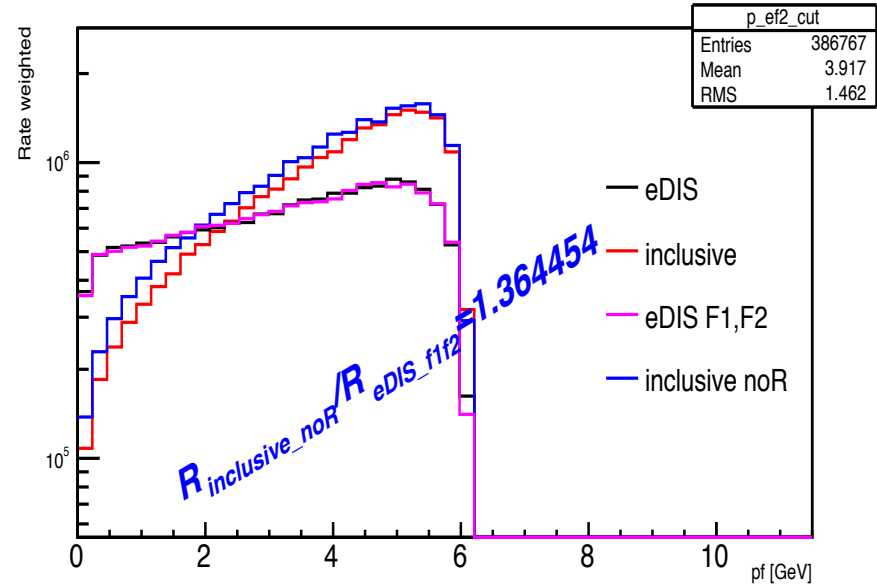
Rate Comparison for PVDIS LH2 target Q2>1



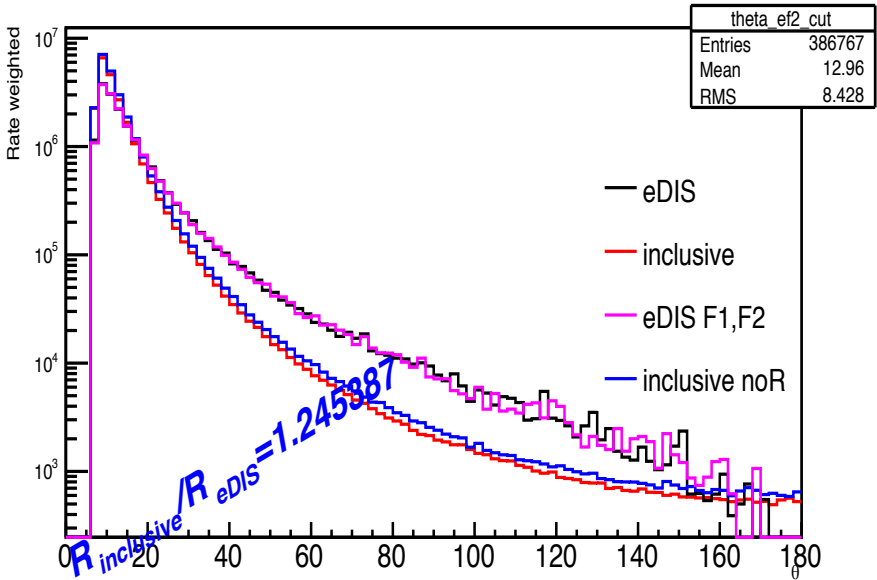
Rate Comparison for PVDIS LH2 target

Q2>1 and W>3 cuts

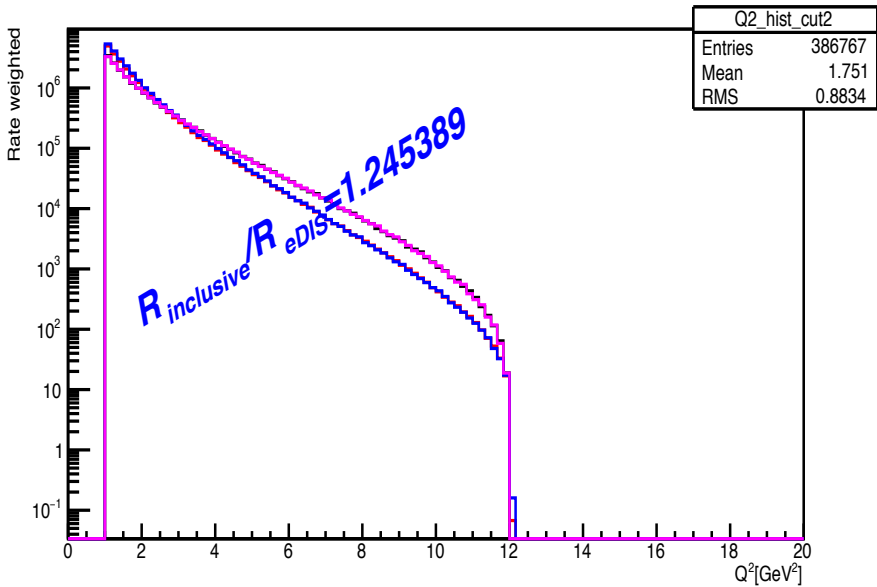
Q2>1 && W>3



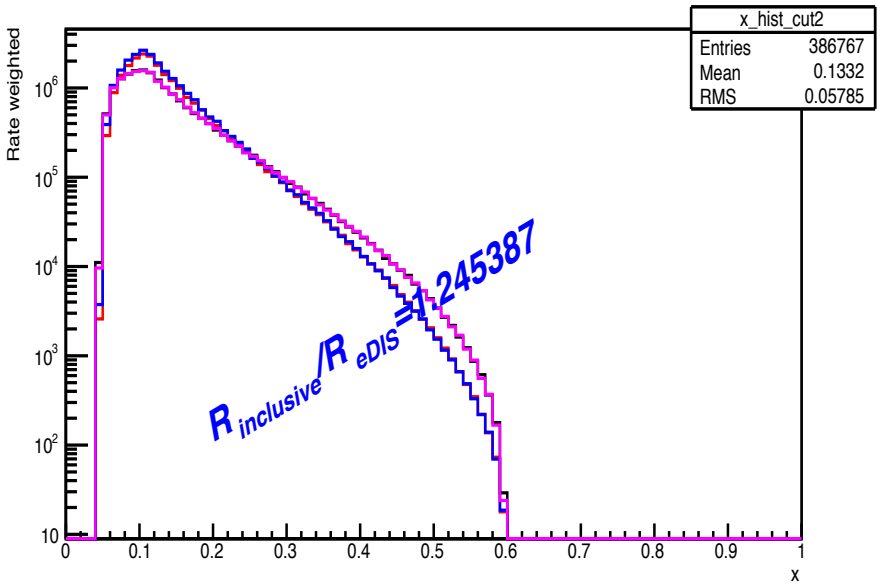
Q2>1 && W>3



Q2>1&& W>3

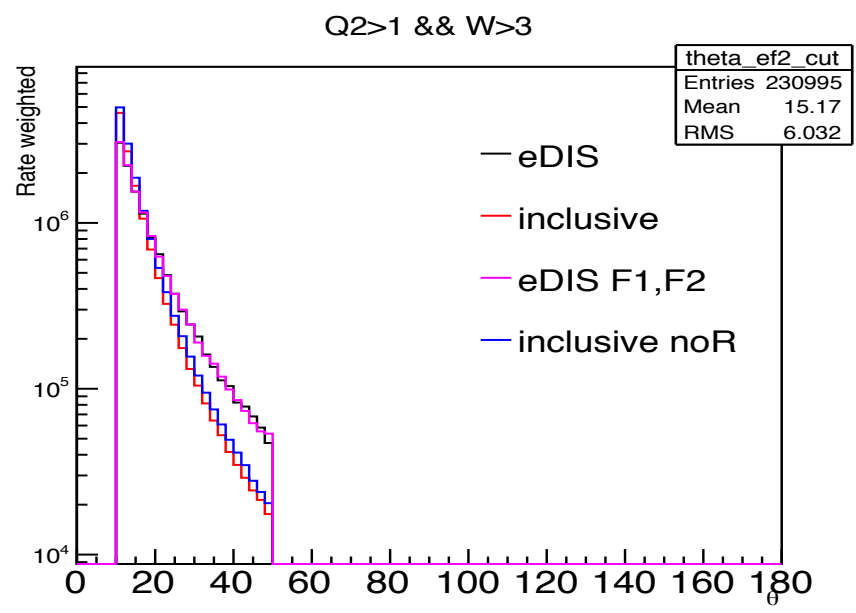
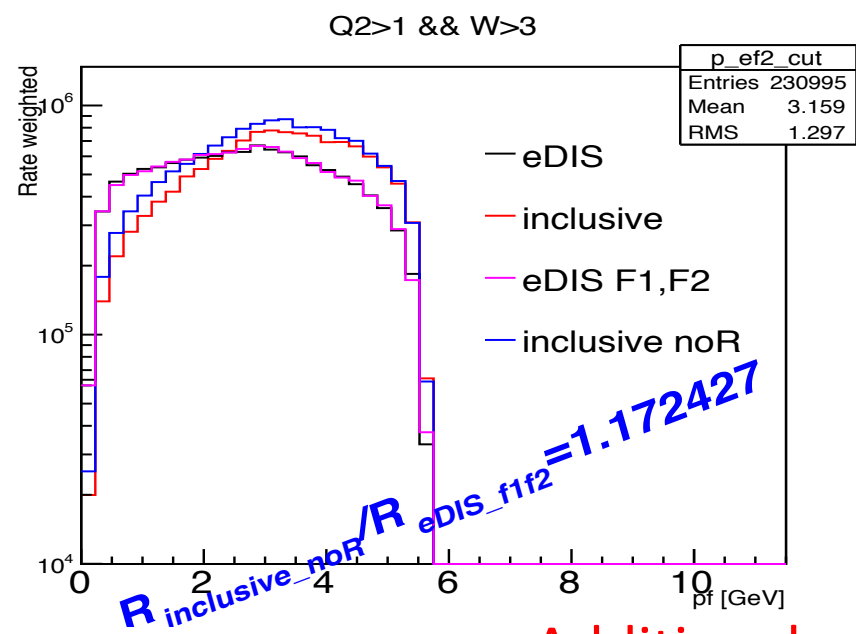


Q2>1&& W>3

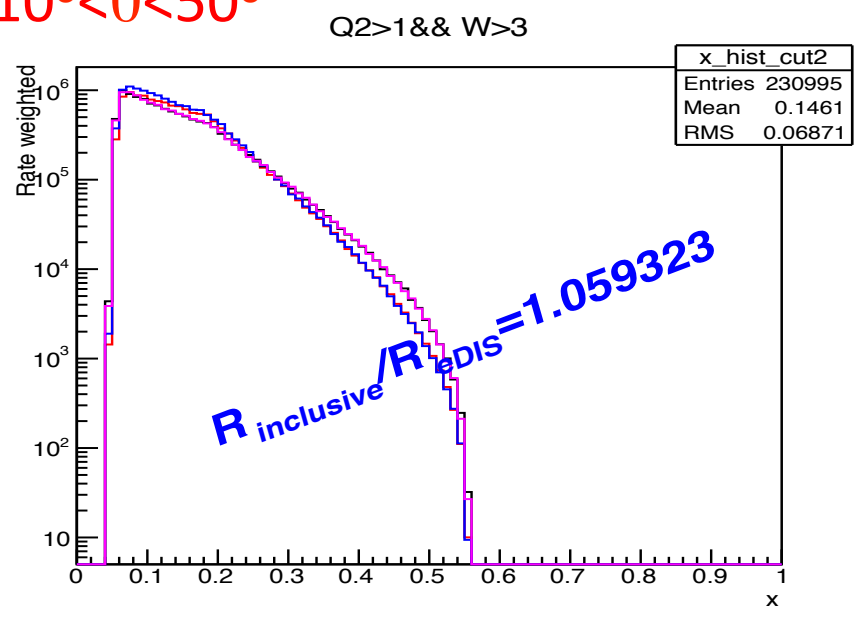
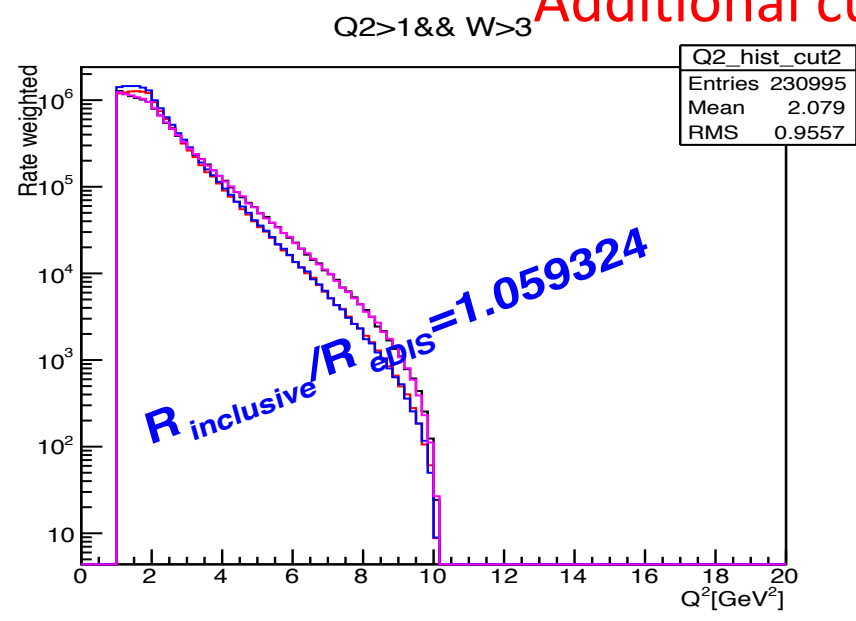


Rate Comparison for PVDIS LH2 target

Q2>1 and W>3 cuts

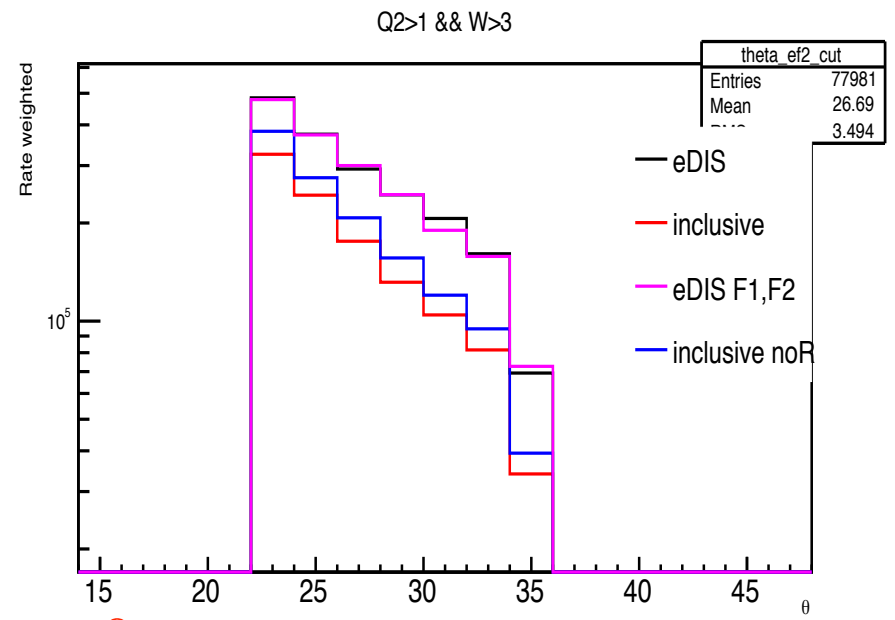
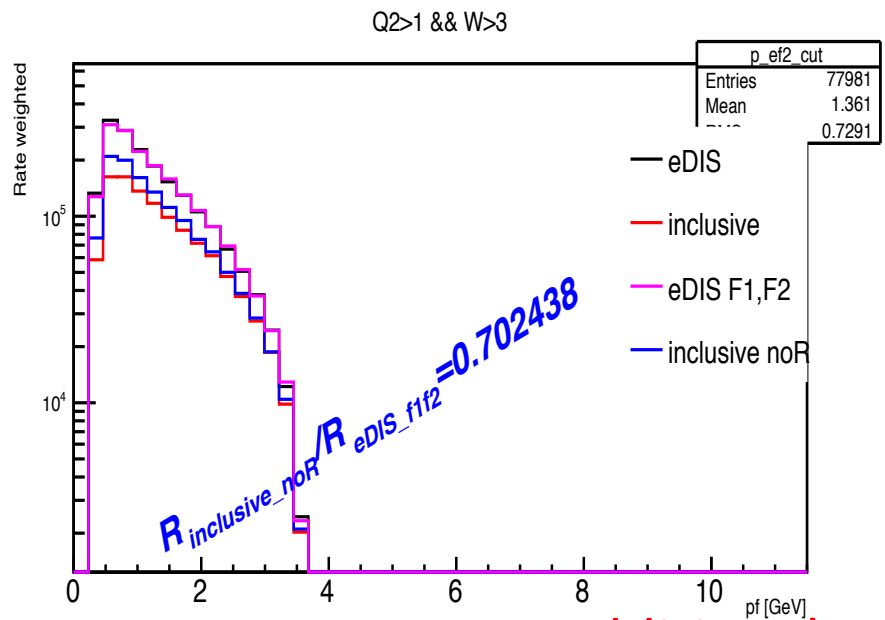


Additional cut $10^\circ < \theta < 50^\circ$

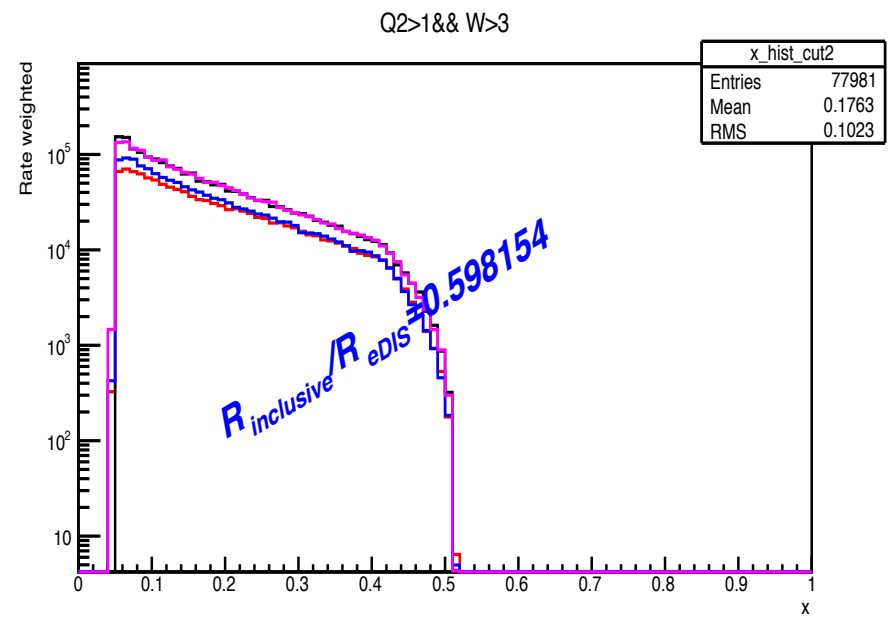
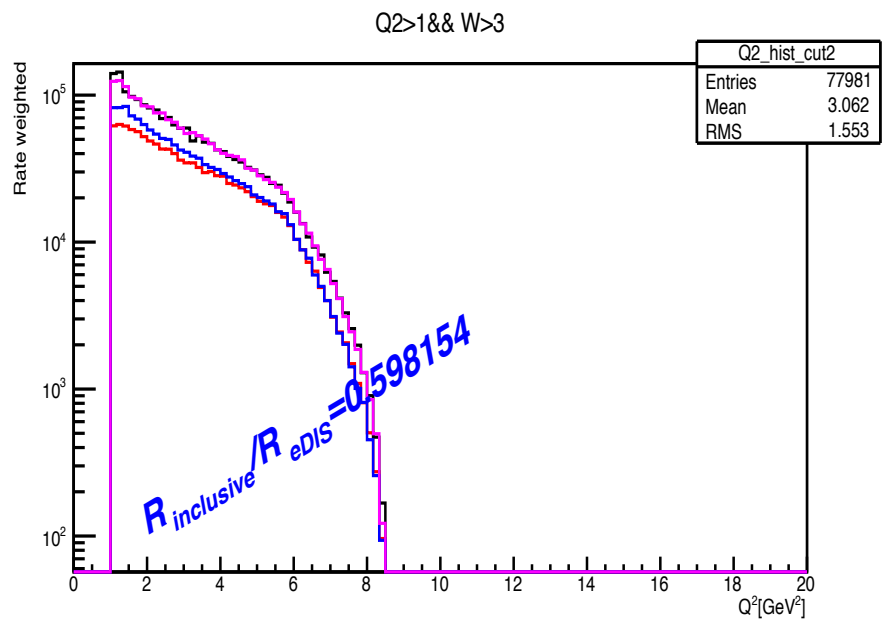


Rate Comparison for PVDIS LH2 target

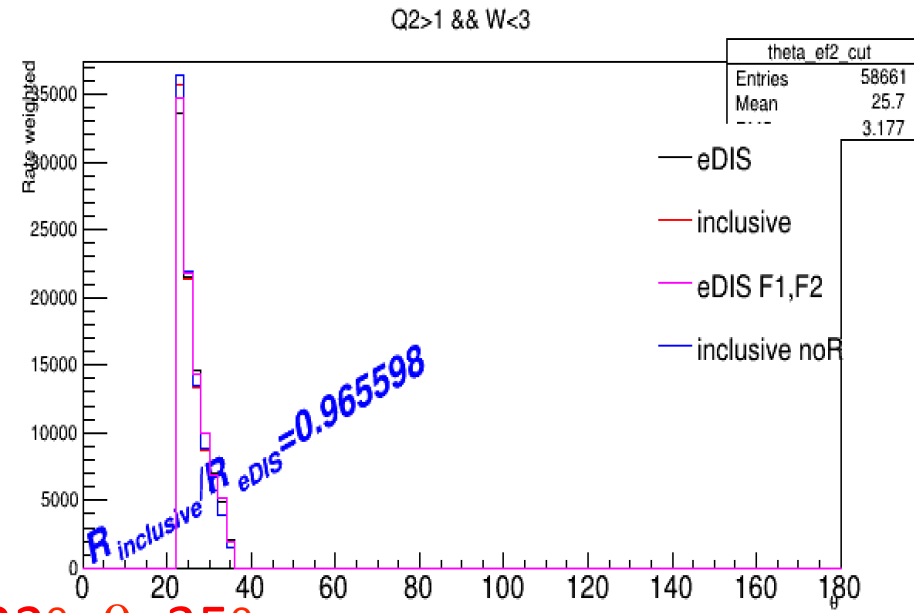
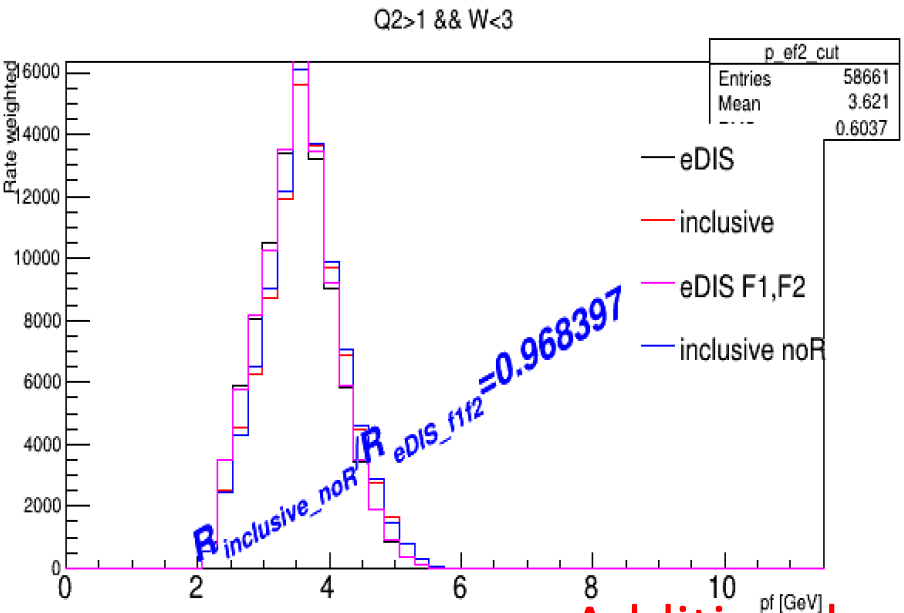
Q2>1 and W>3 cuts



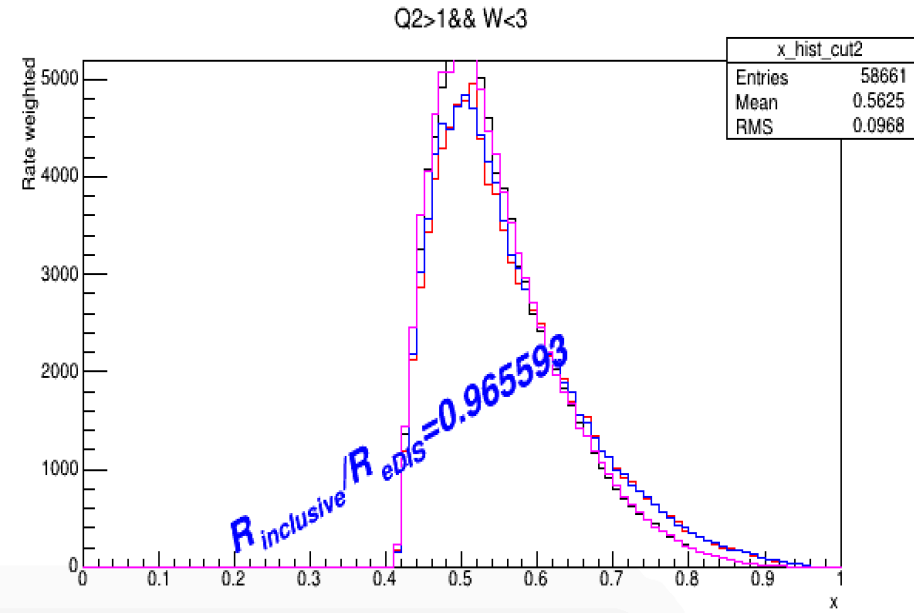
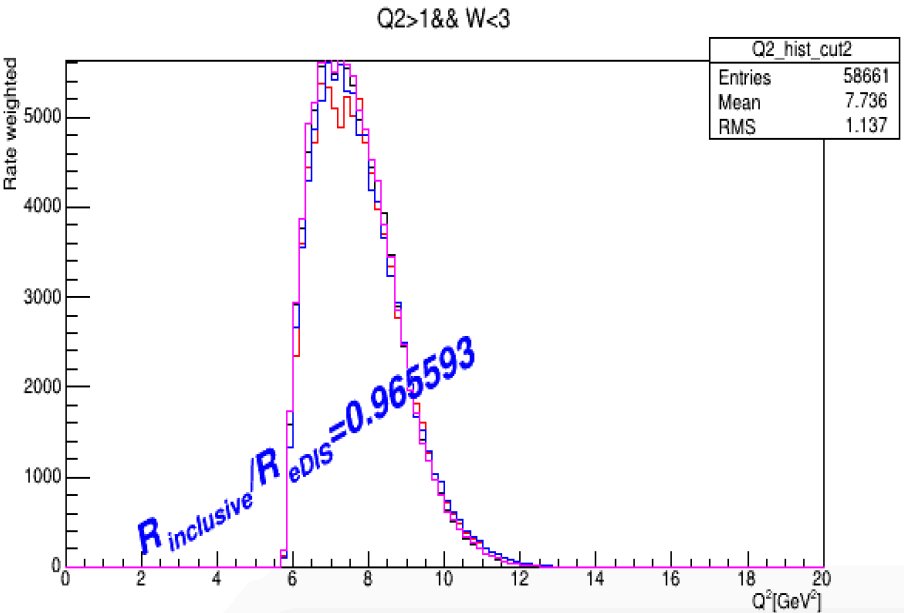
Additional cut $22^\circ < \theta < 35^\circ$



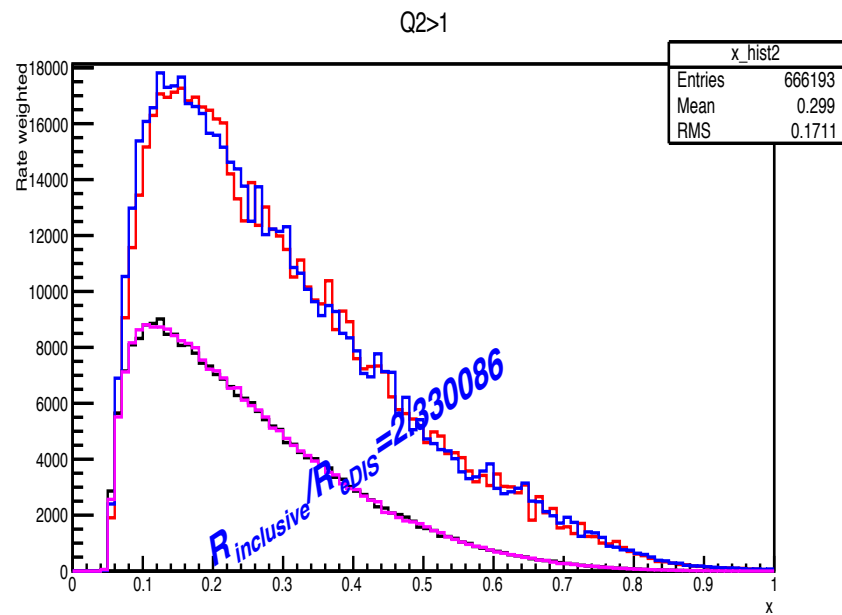
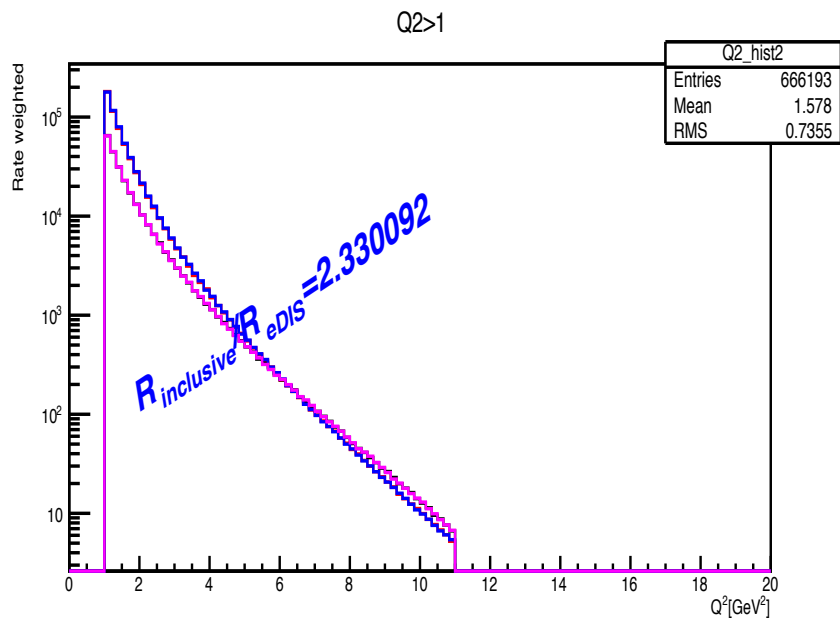
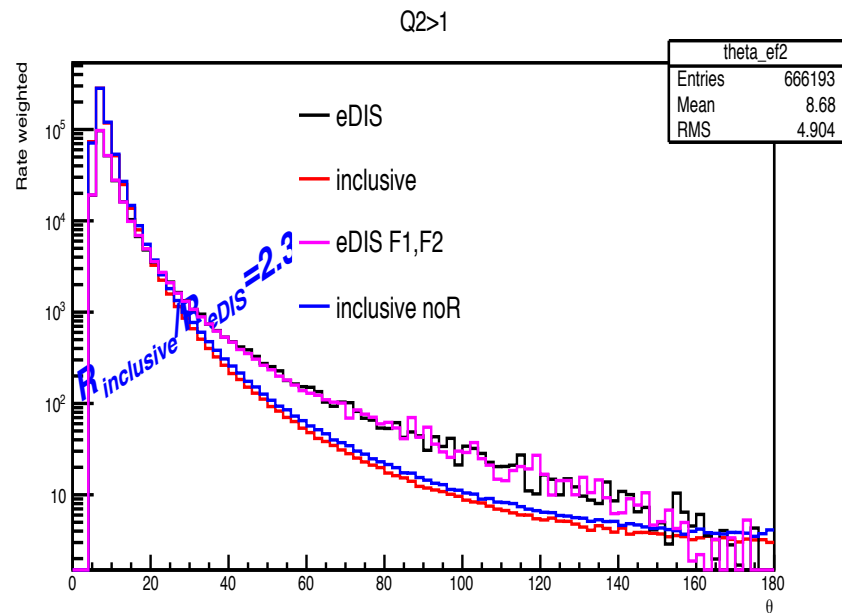
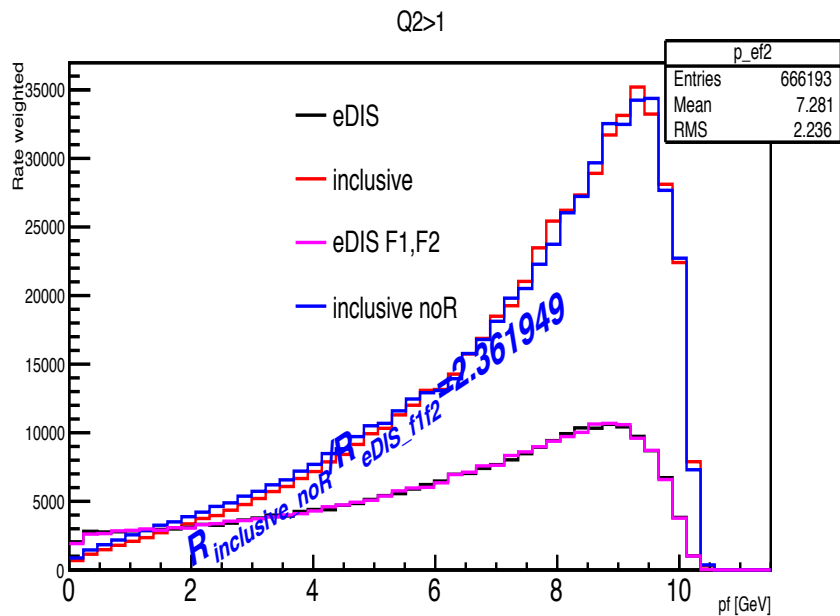
Rate Comparison for PVDIS LH2 target X>0.35 and W<3 cuts



Additional cut $22^\circ < \theta < 35^\circ$

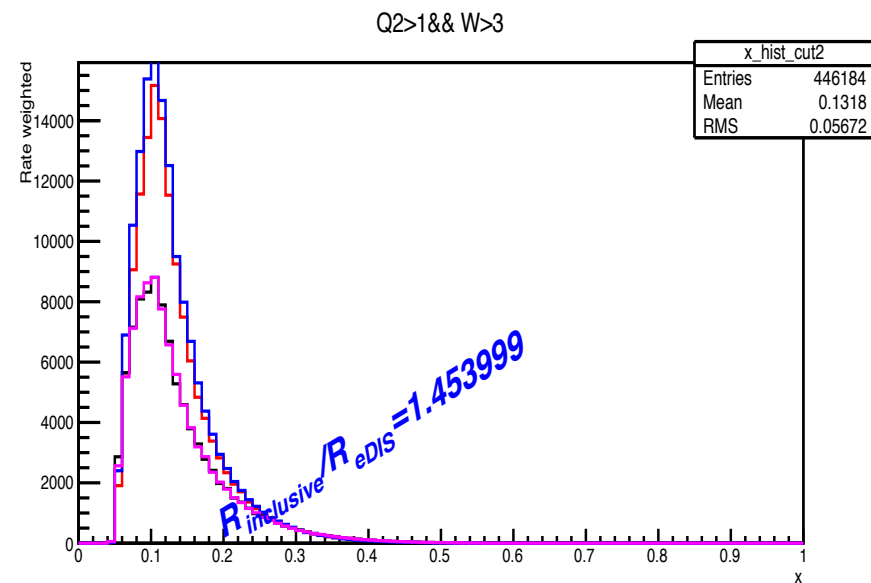
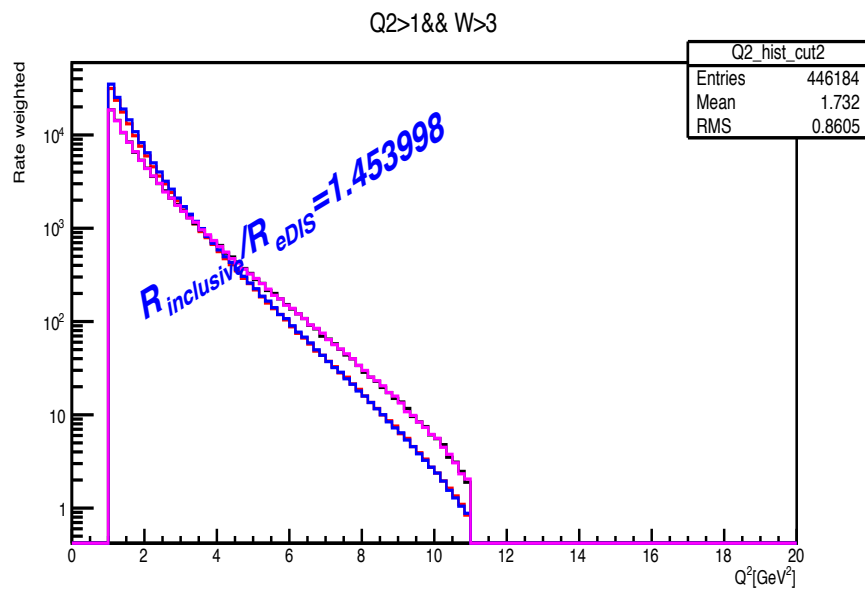
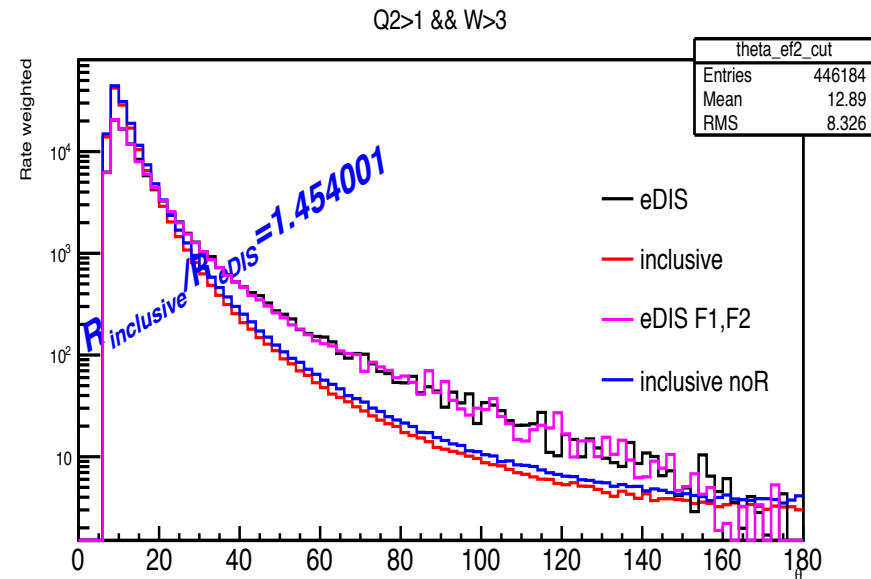
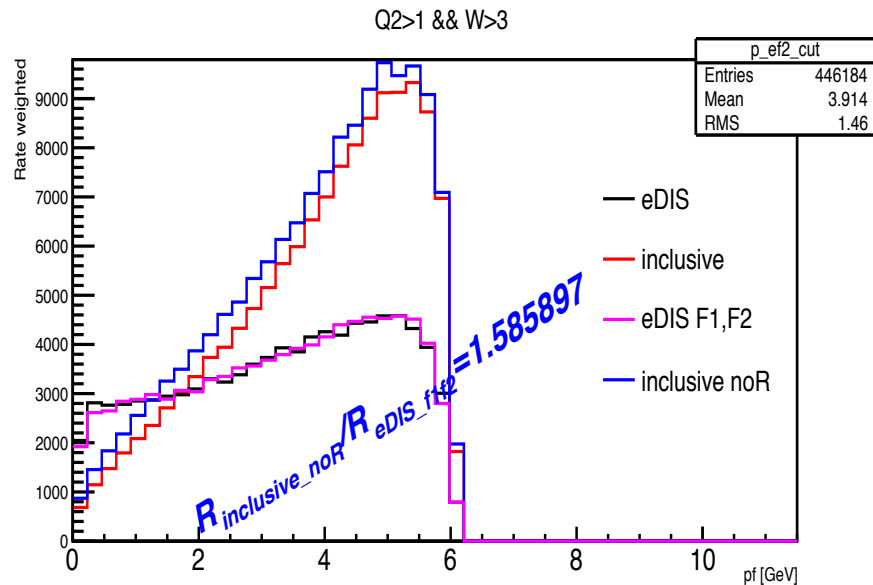


Rate Comparison for SIDIS ^3He target $Q^2 > 1$



Rate Comparison for SIDIS ^3He target

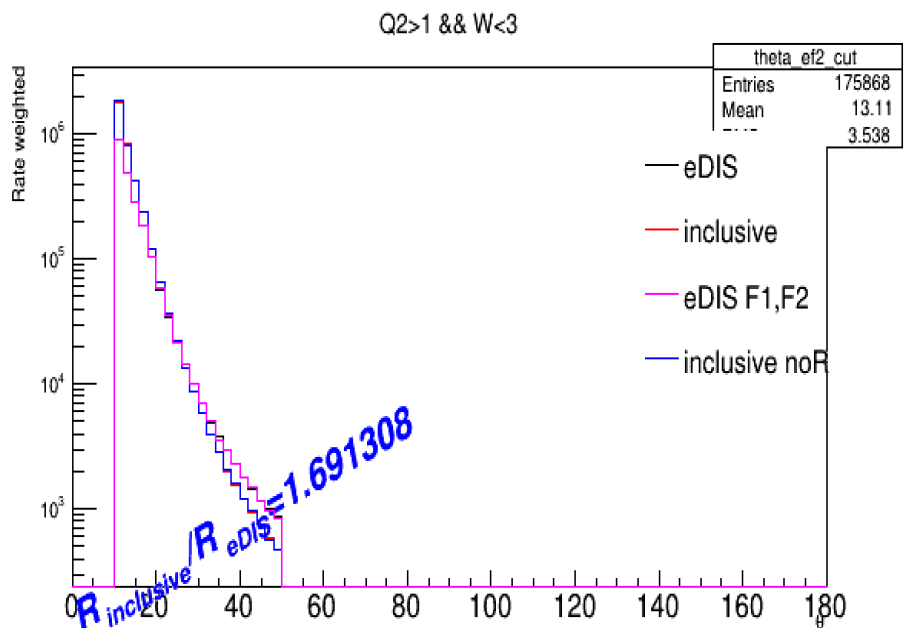
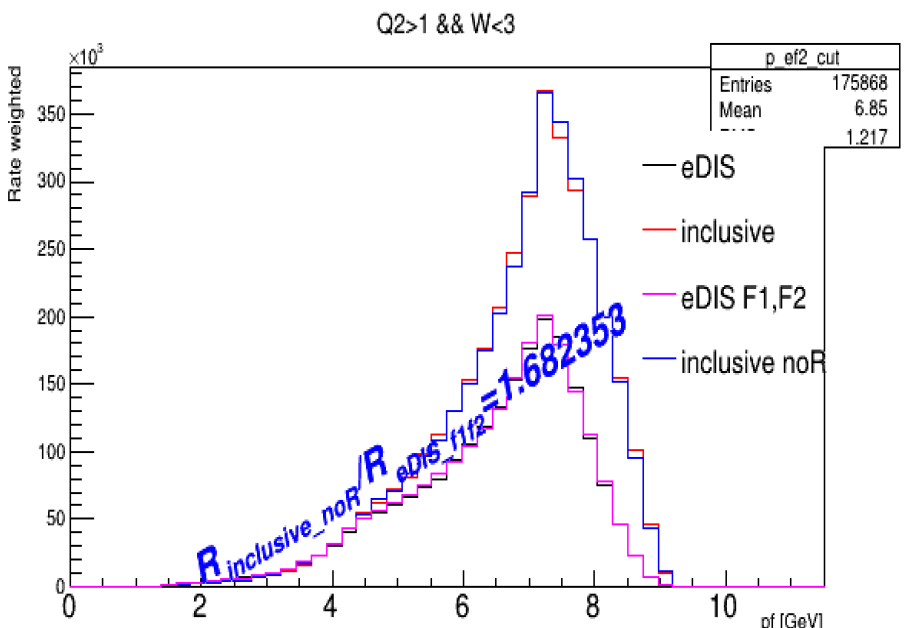
$Q^2 > 1$ $W > 3$



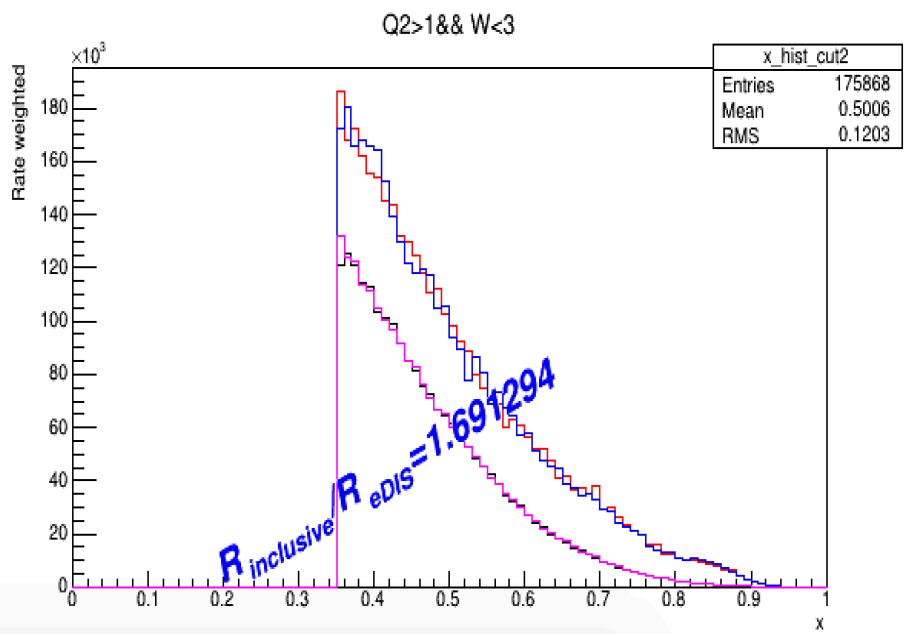
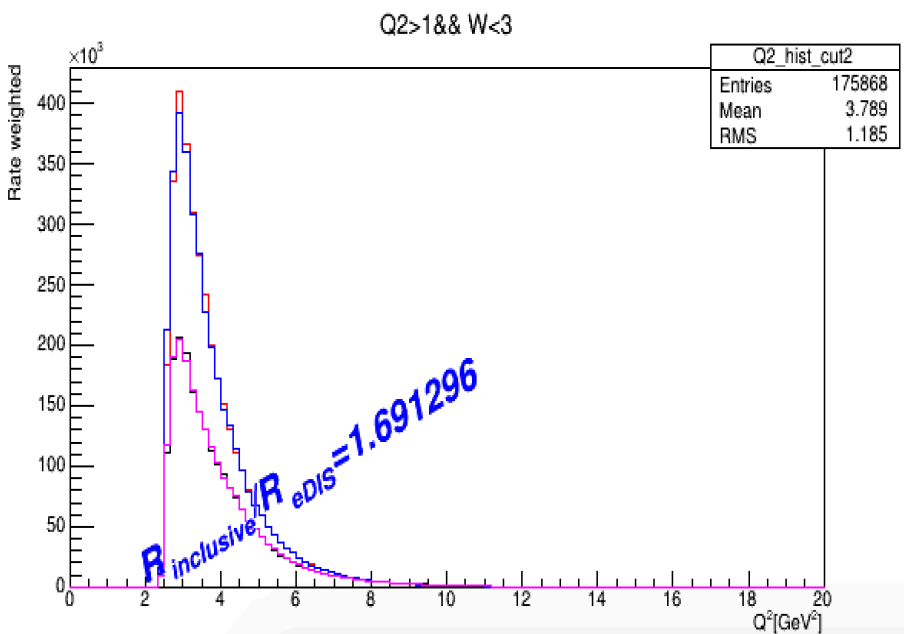
Backup

Rate Comparison for PVDIS LH2 target

x>0.35 and W<3 cuts

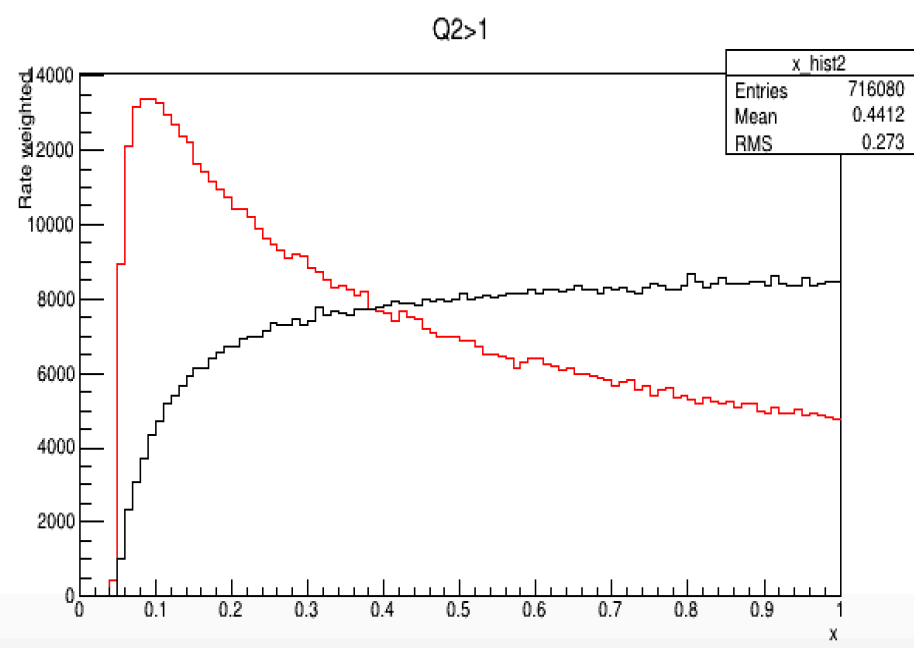
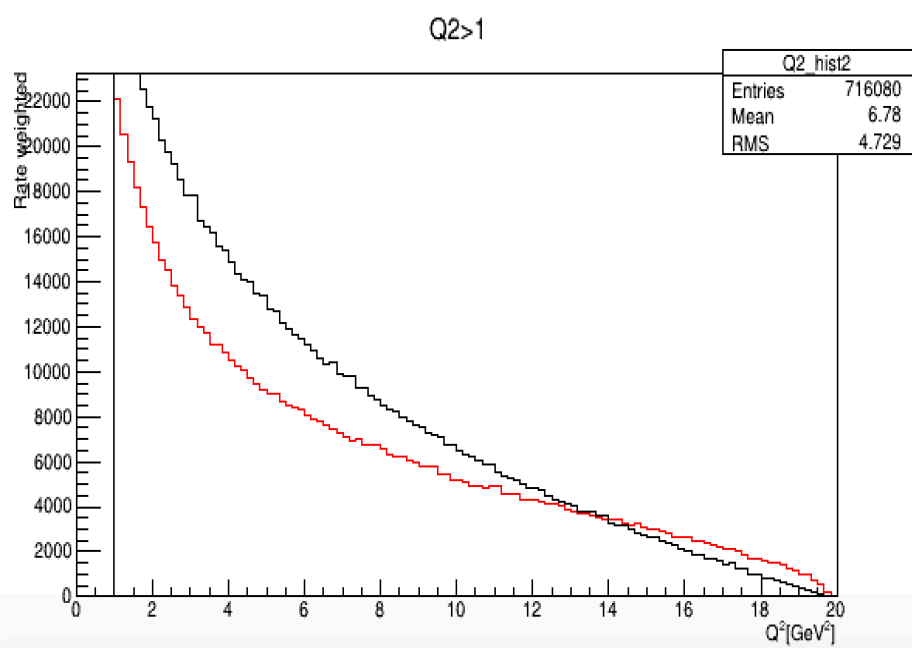
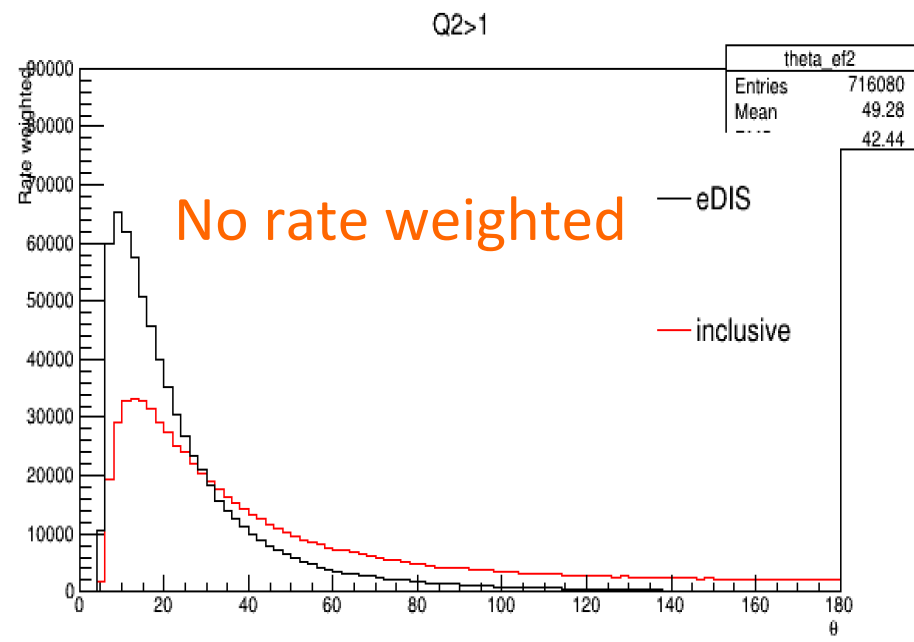
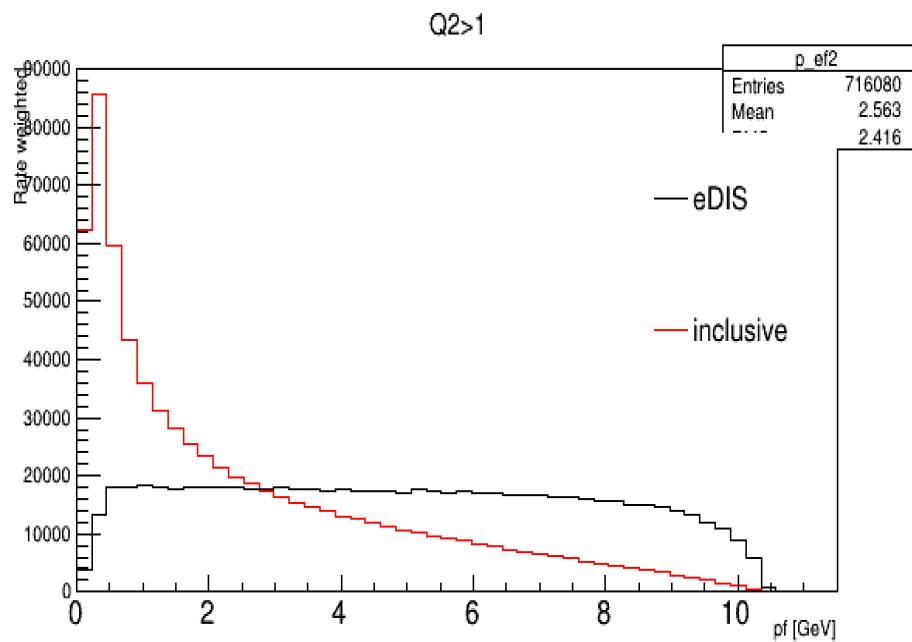


Additional cut $10^\circ < \theta < 50^\circ$



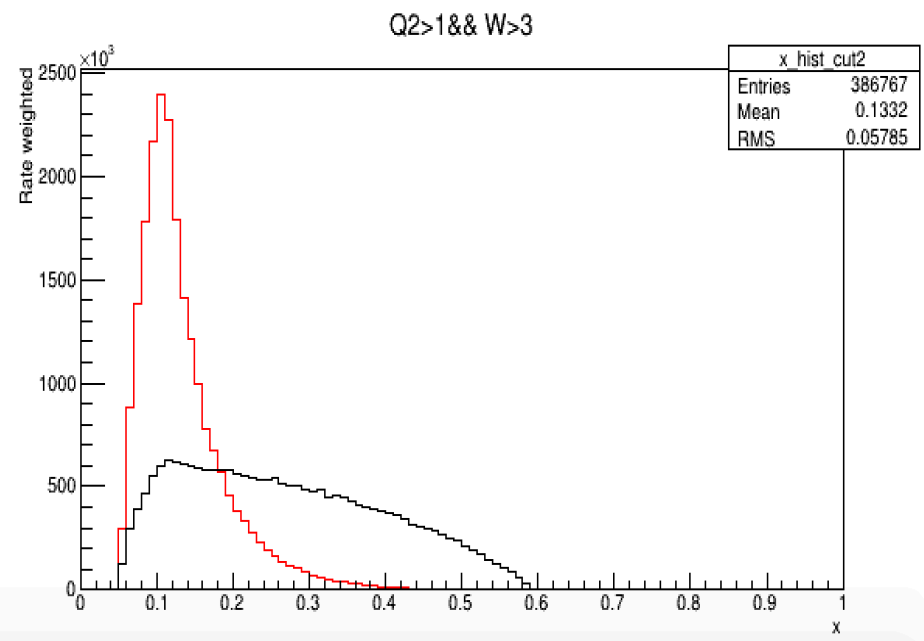
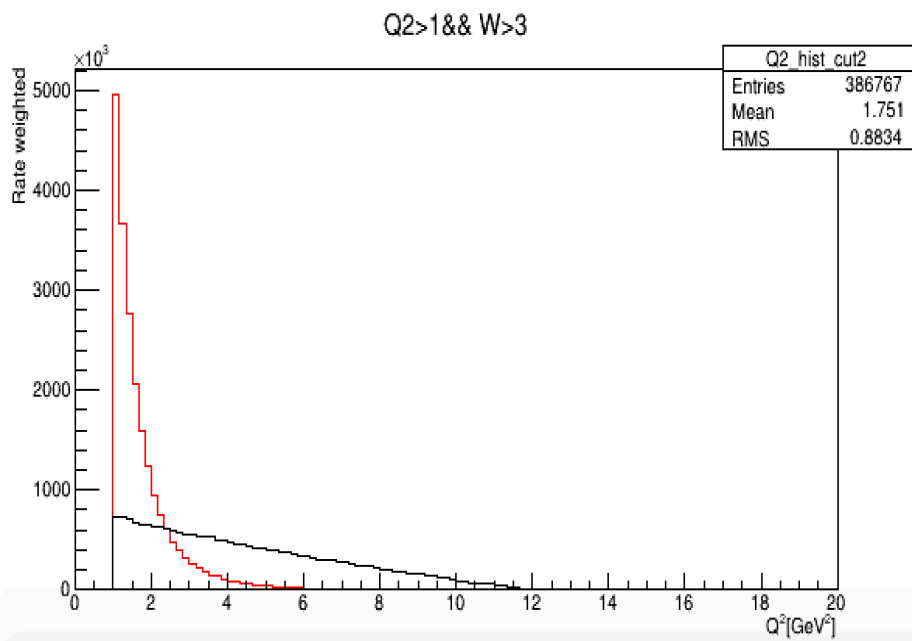
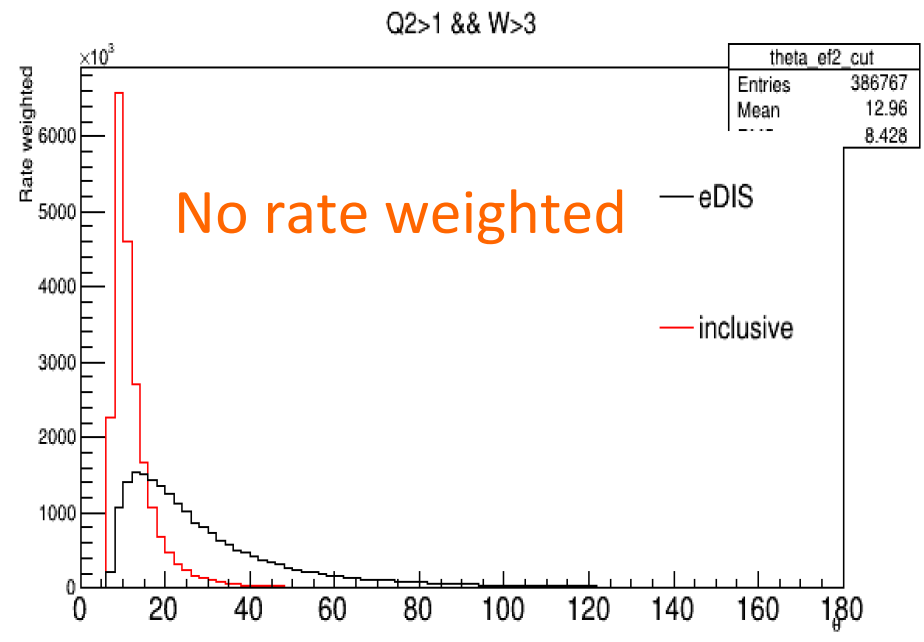
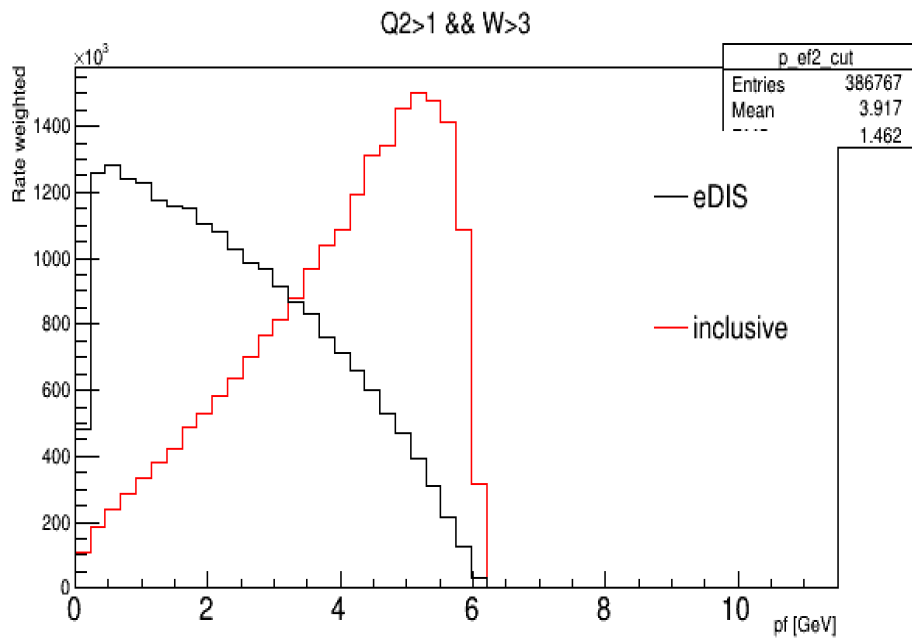
Rate Comparison for PVDIS LH2 target

Q2>1

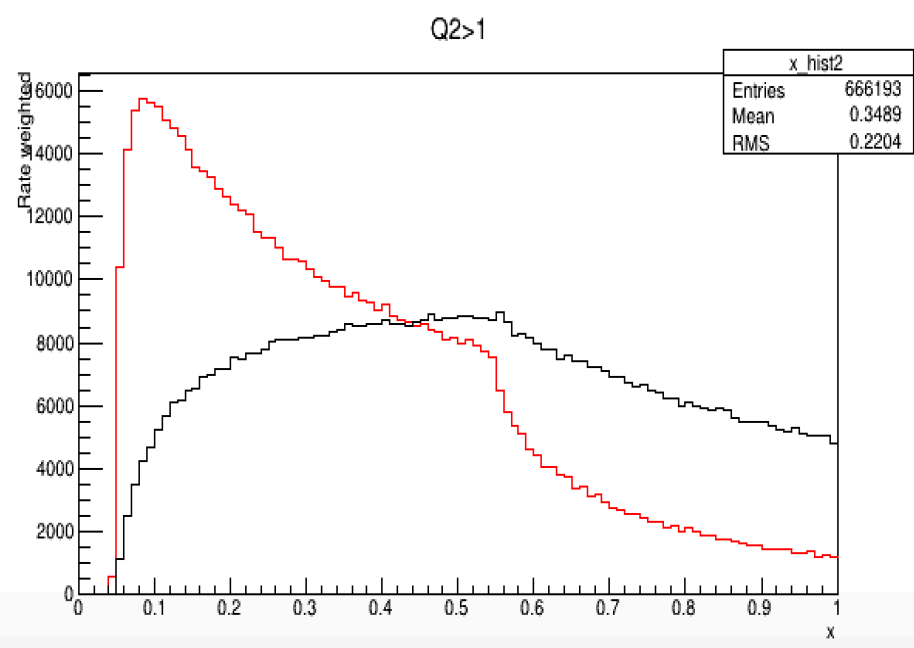
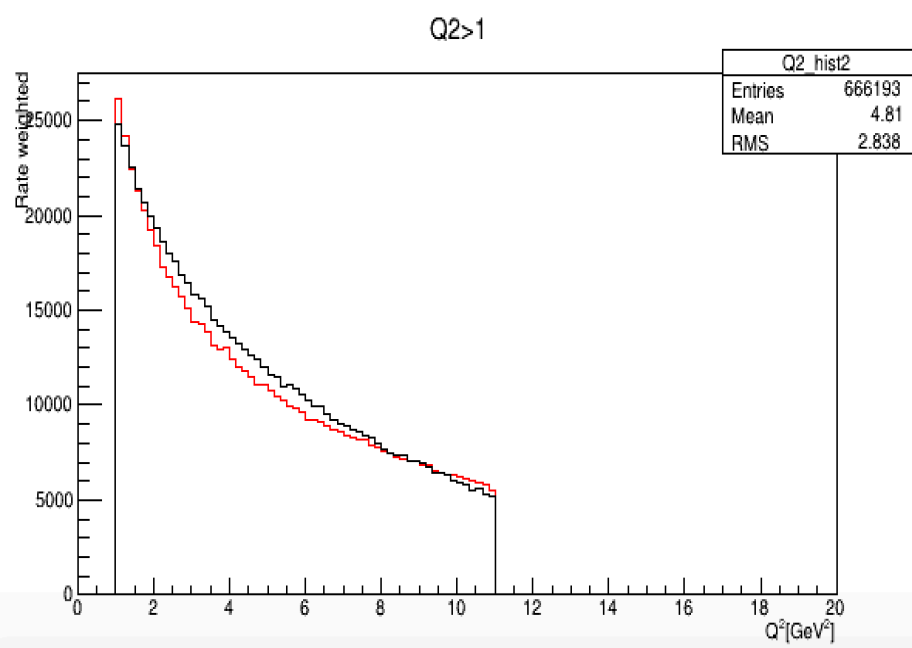
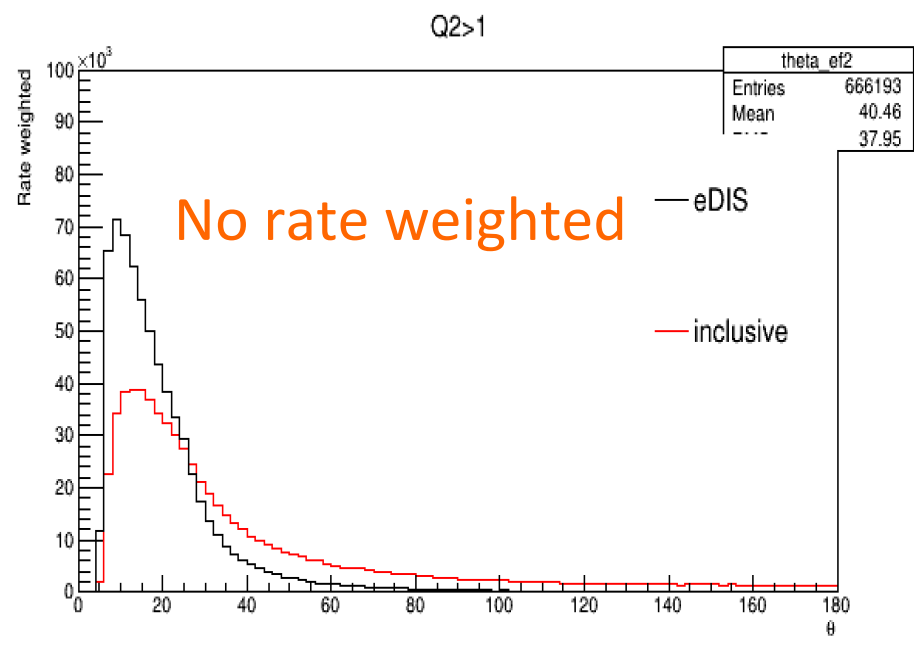
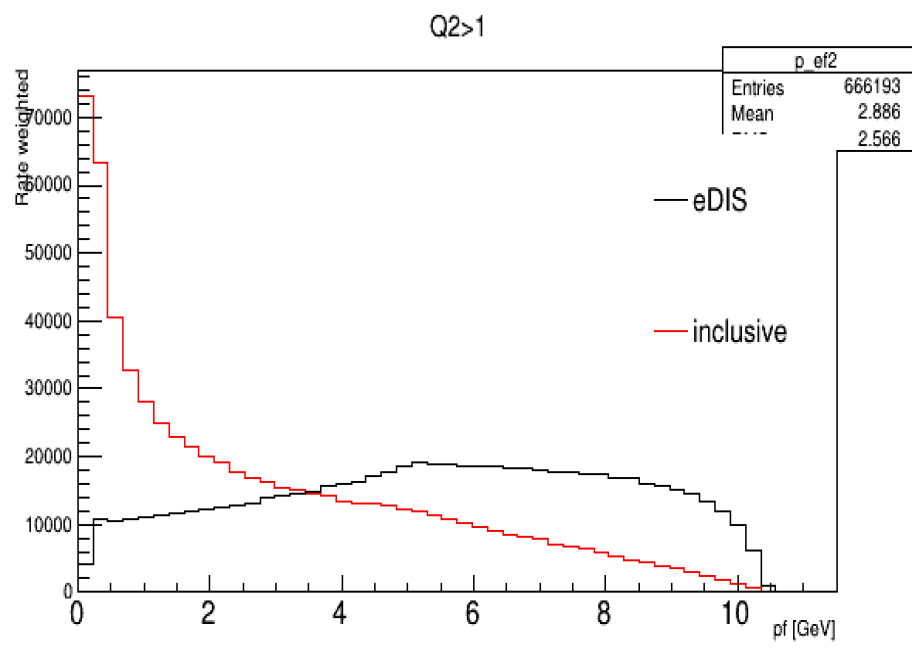


Rate Comparison for PVDIS LH2 target

Q2>1 W>3

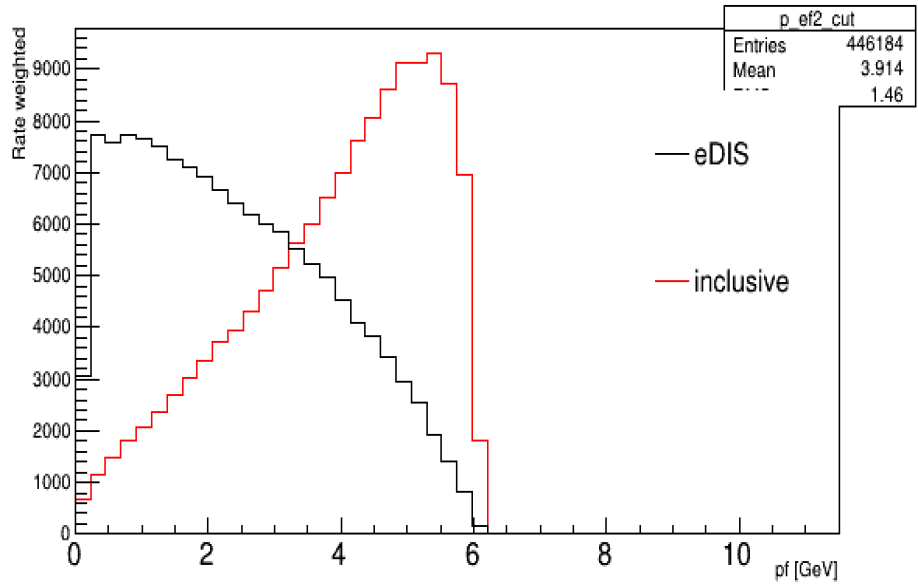


Kinematic Comparison for SIDIS ^3He target $Q^2 > 1$

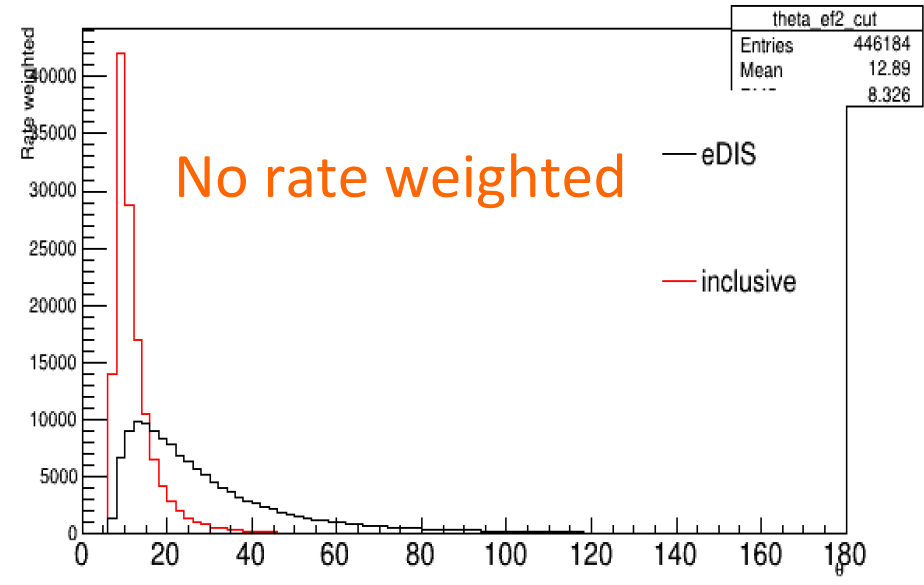


Kinematic Comparison for SIDIS ^3He target $Q^2 > 1$ $W > 3$

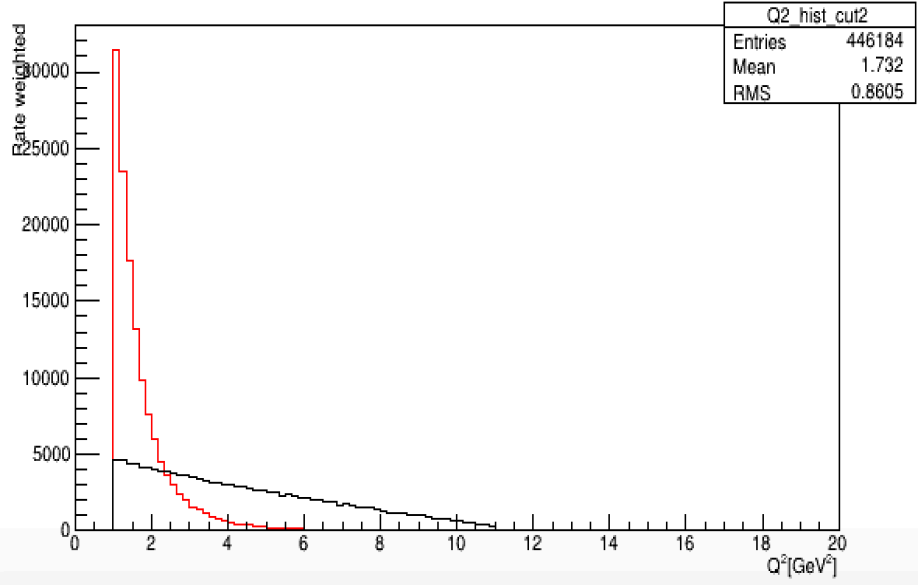
$Q^2 > 1$ & $W > 3$



$Q^2 > 1$ & $W > 3$



$Q^2 > 1$ & $W > 3$



$Q^2 > 1$ & $W > 3$

