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 $i = \mathrm{NC}, \mathrm{CC}$ corresponds to neutral-current ($eN \to eX$) or charged-current ($eN \to \nu X$ or $\nu N \to eX$) processes, respectively. For incoming neutrinos, $L^W_{\mu\nu}$ 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 $\overline{\nu}$ and the $+$ sign for an incoming e^- or ν. The factor $\eta^{\mathrm{NC}} = 1$ for unpolarized $e^\pm$ beams, whereas*

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

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

Solid inclusive e

F1=Z*F1p+(A–Z)*F1n; The W<3 GeV Peter Bosted fit (Q^2<11 $(GeV/C)^2$)

F2=Z*F2p+(A–Z)*F2n; The W>3 GeV world PDF sets

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

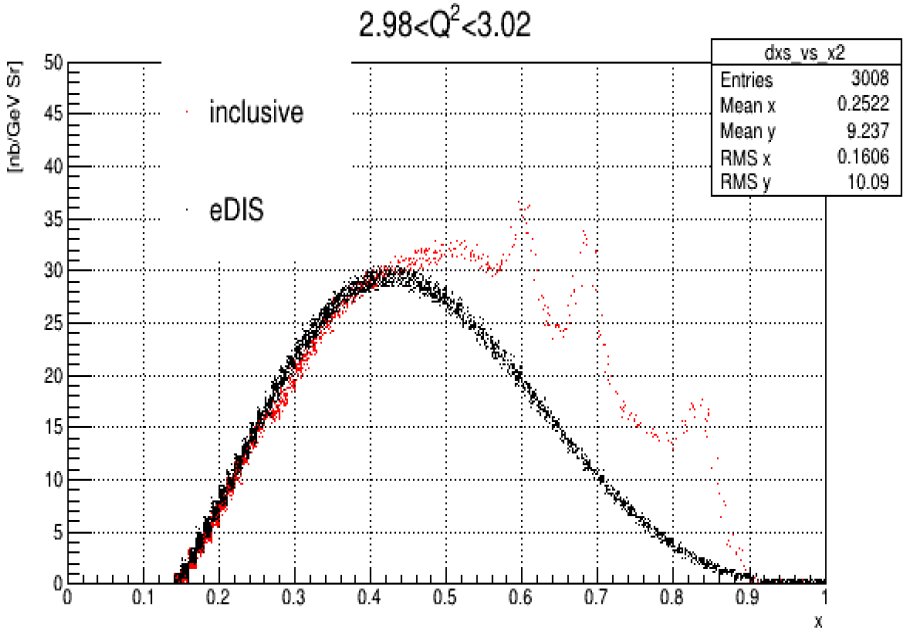
$$\sigma_{Mott} = \frac{4a^2E'^2}{Q^4}cos^2\frac{\theta}{2}$$

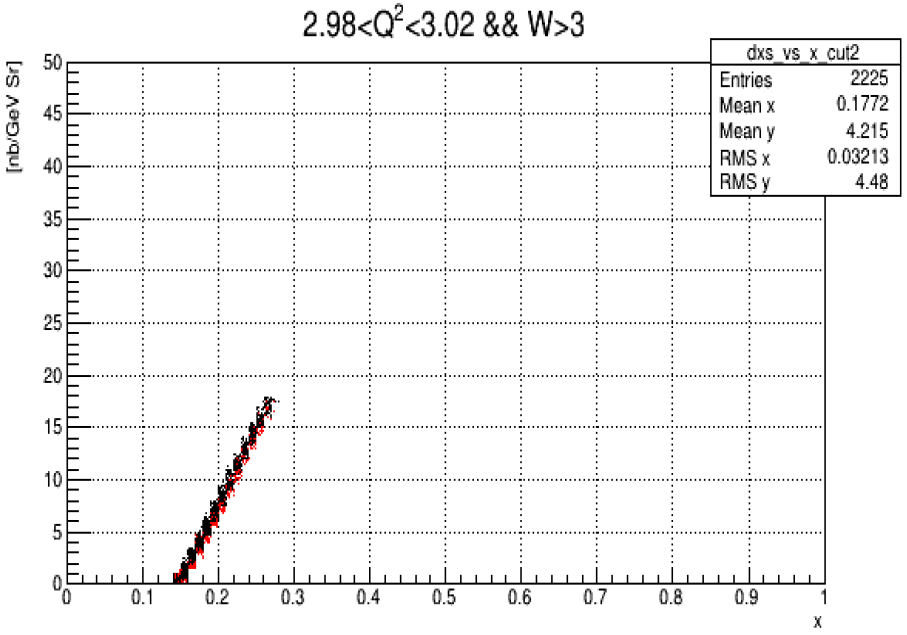
cross section comparison:

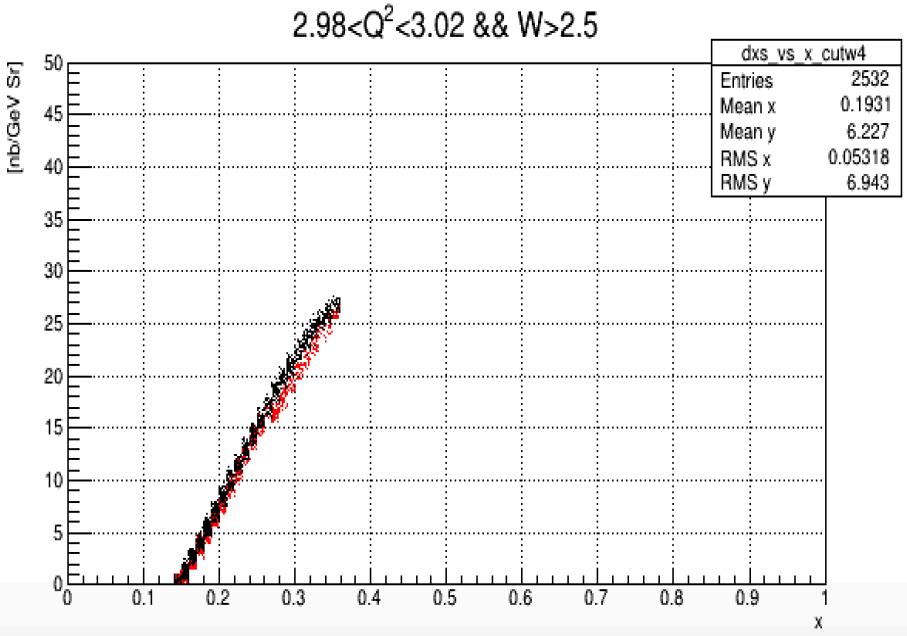
$$dE'd\Omega = \frac{\pi}{EE'}dQ^2\,d\nu = \frac{2ME}{E'}\pi\ y\ dx\ dy$$

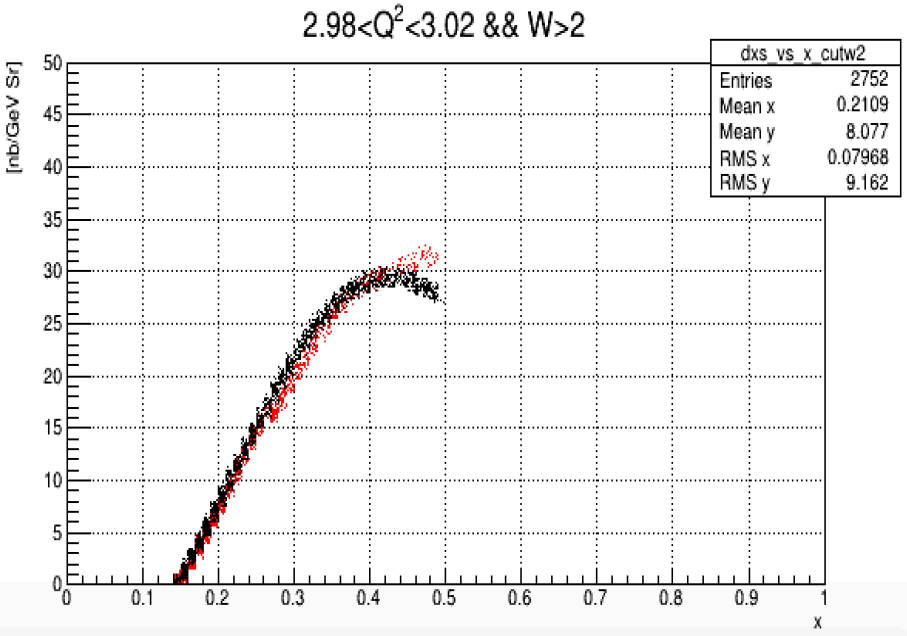
$$\dot{N} = \sigma * \mathcal{L} = \frac{d^2\sigma}{dE'd\Omega}dE' * d\Omega * \mathcal{L}$$

Differential Cross Section Comparison for PVDIS LH2 target

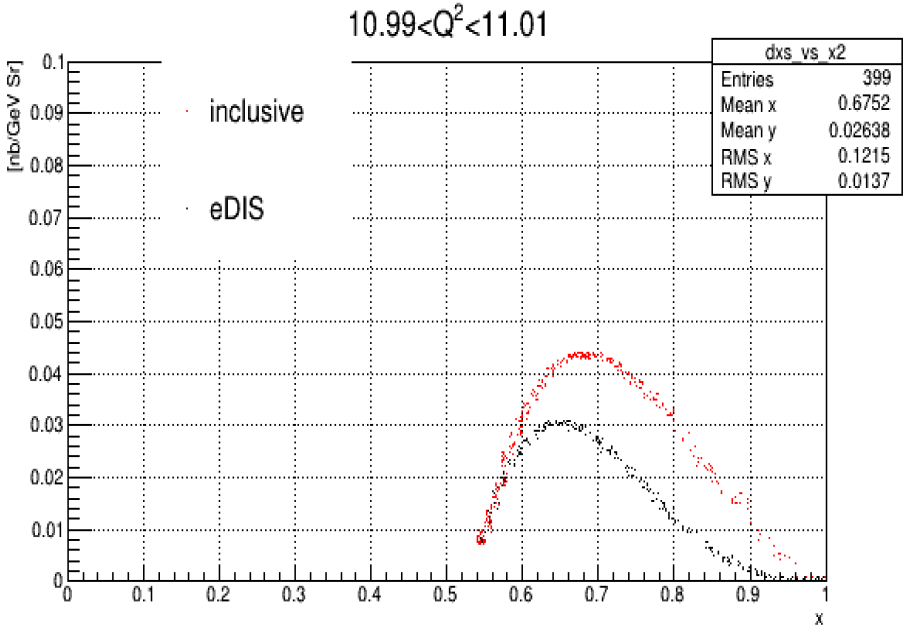


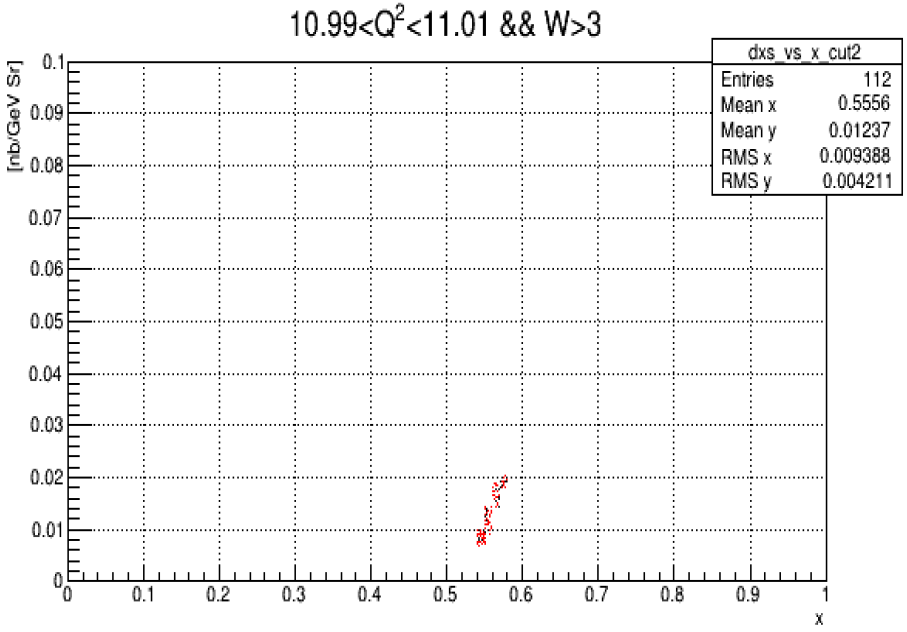


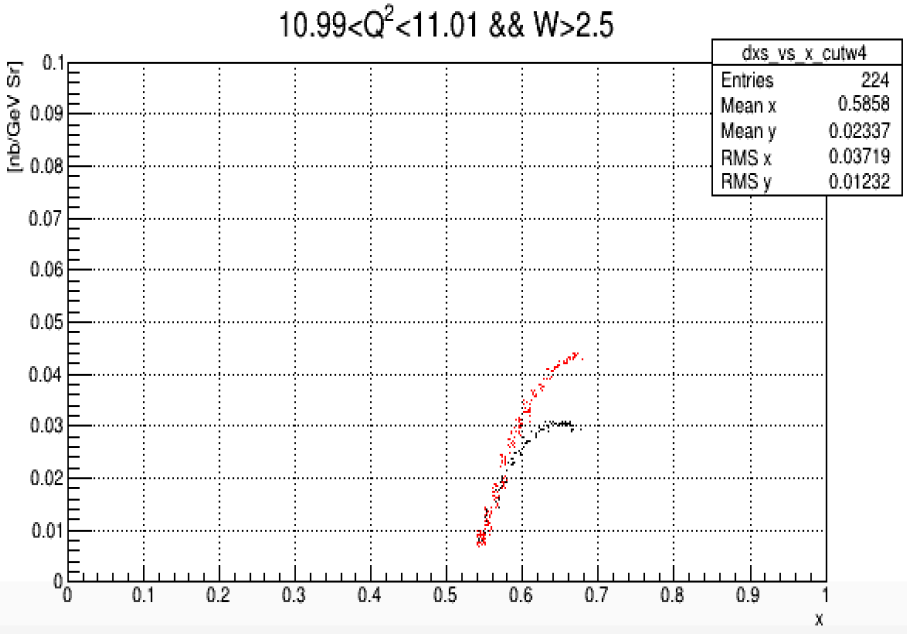


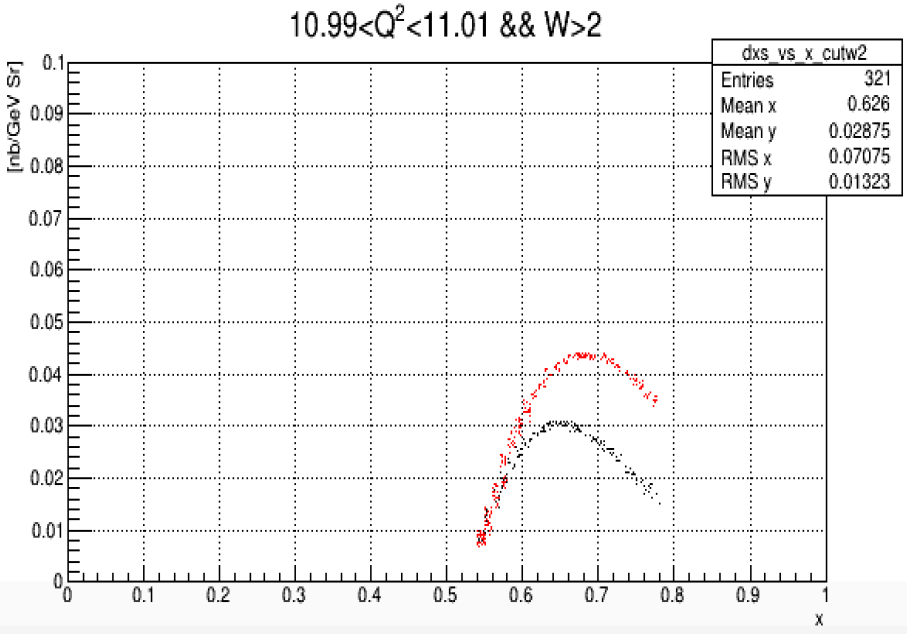


Differential Cross Section Comparison for PVDIS LH2 target



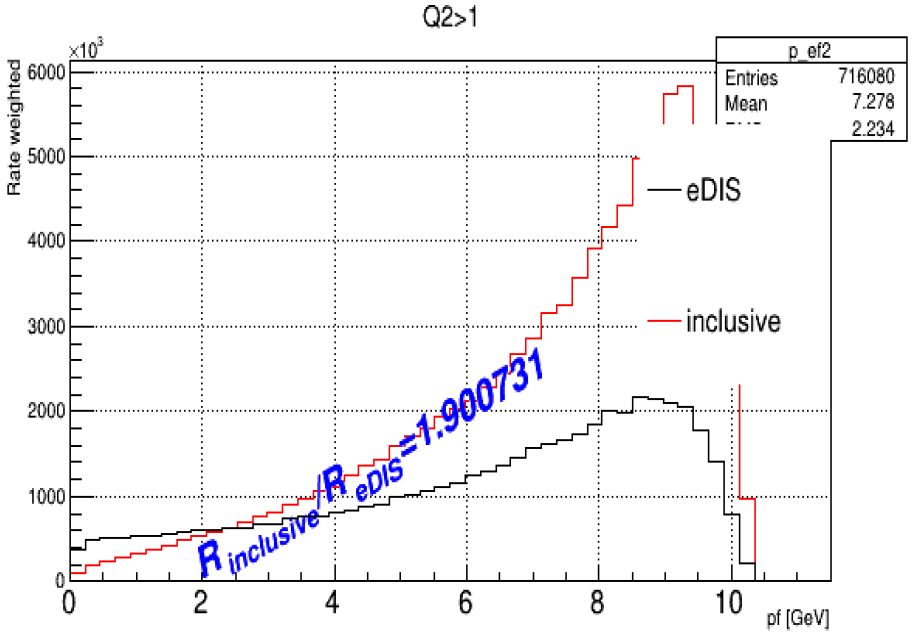


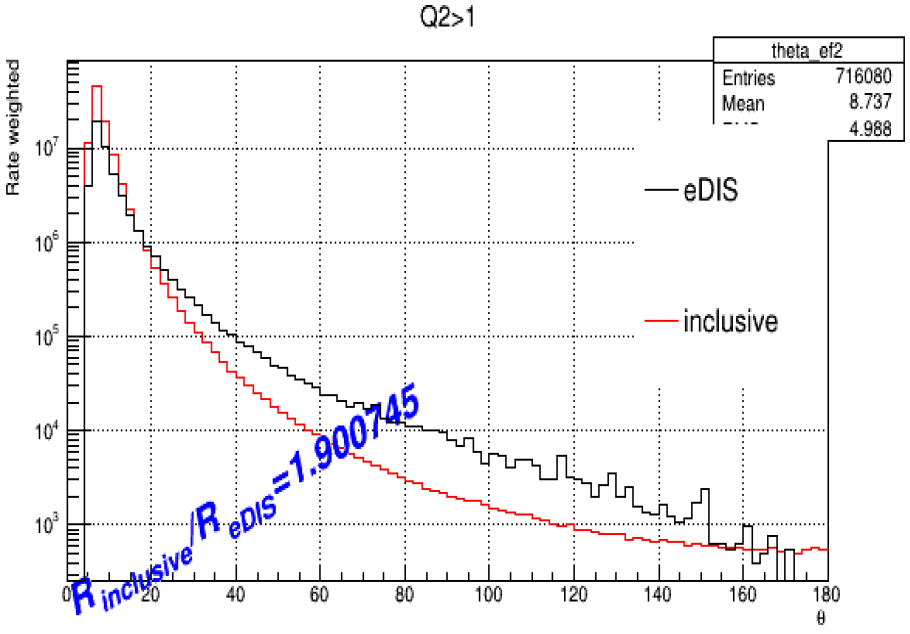


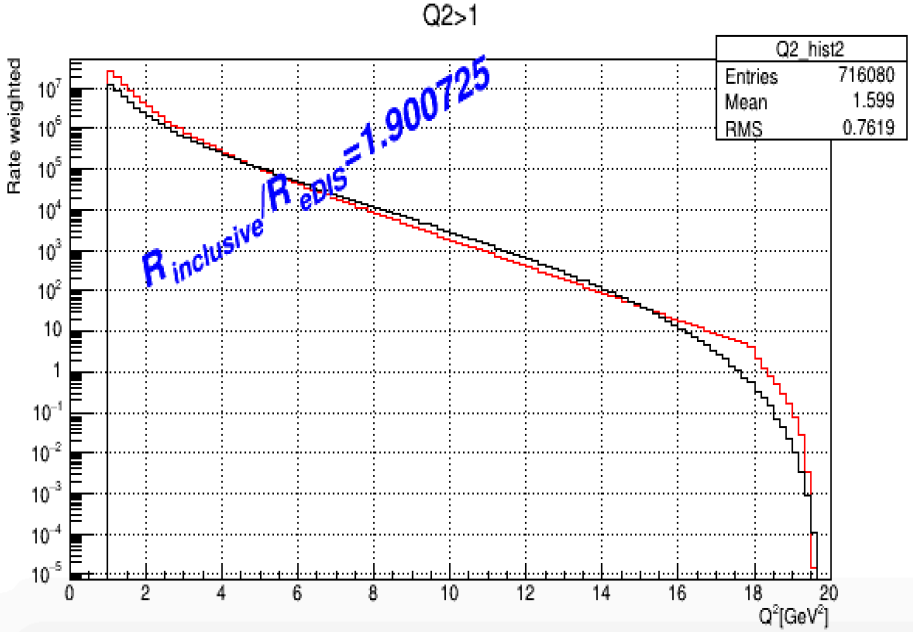


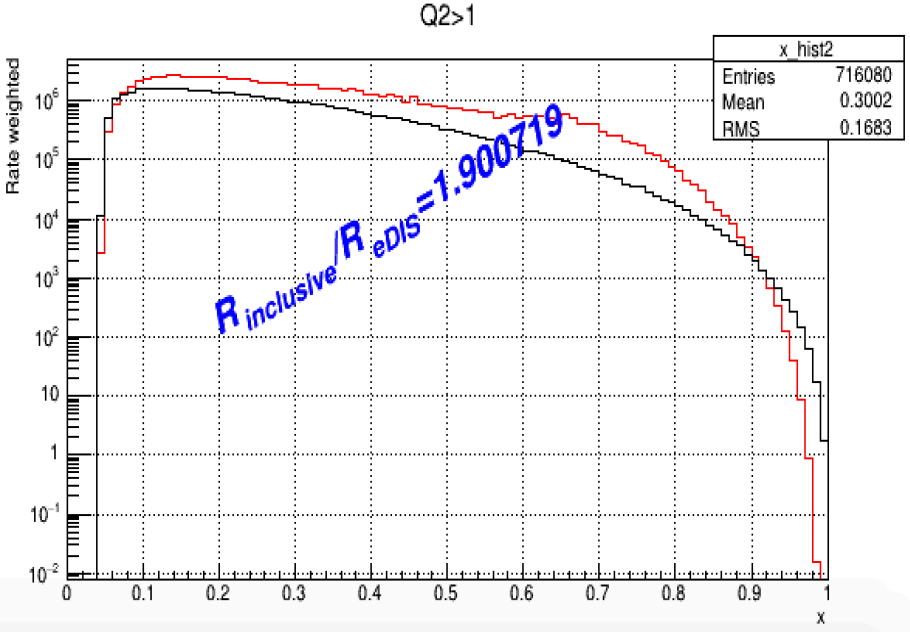
Rate Comparison for PVDIS LH2 target

Q2>1



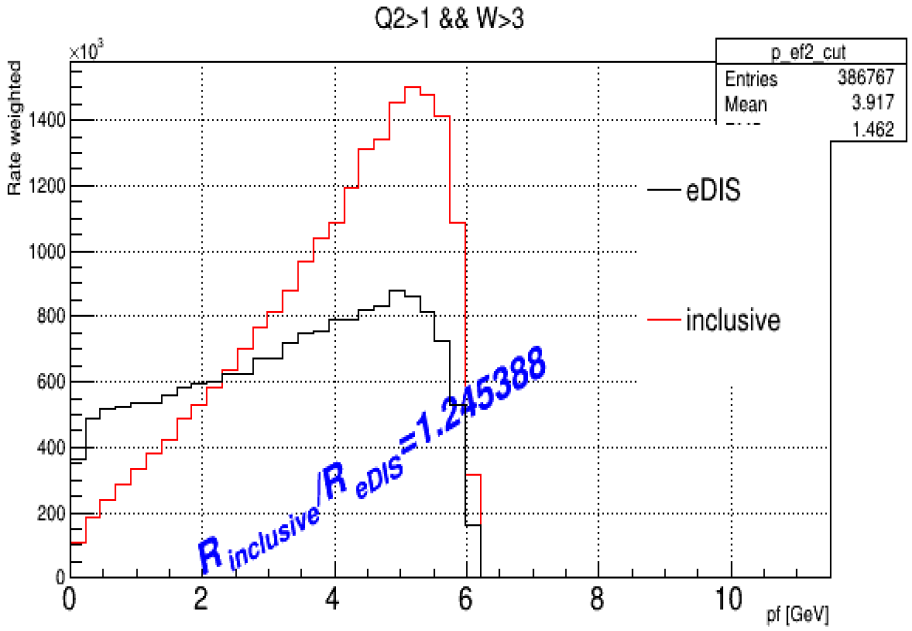


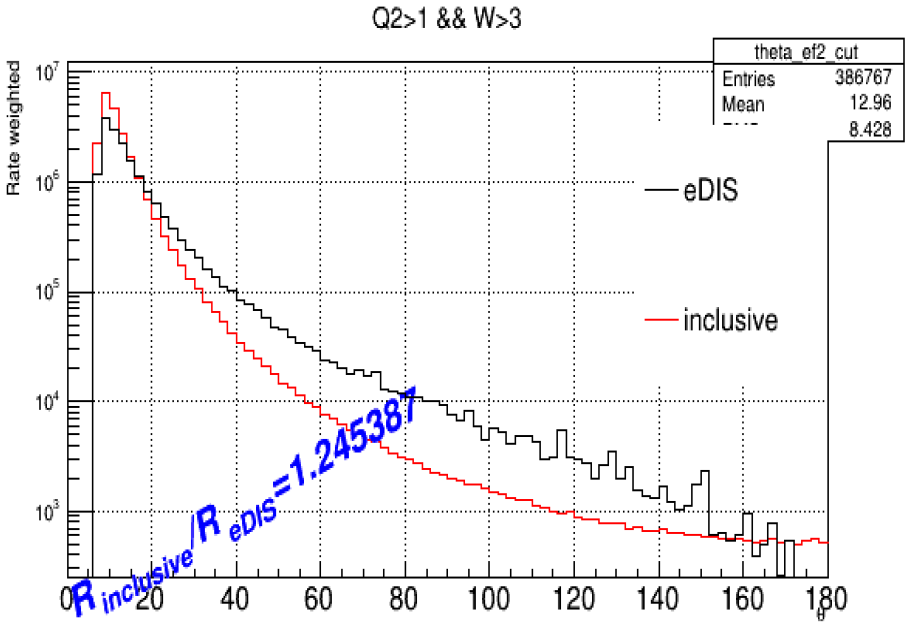


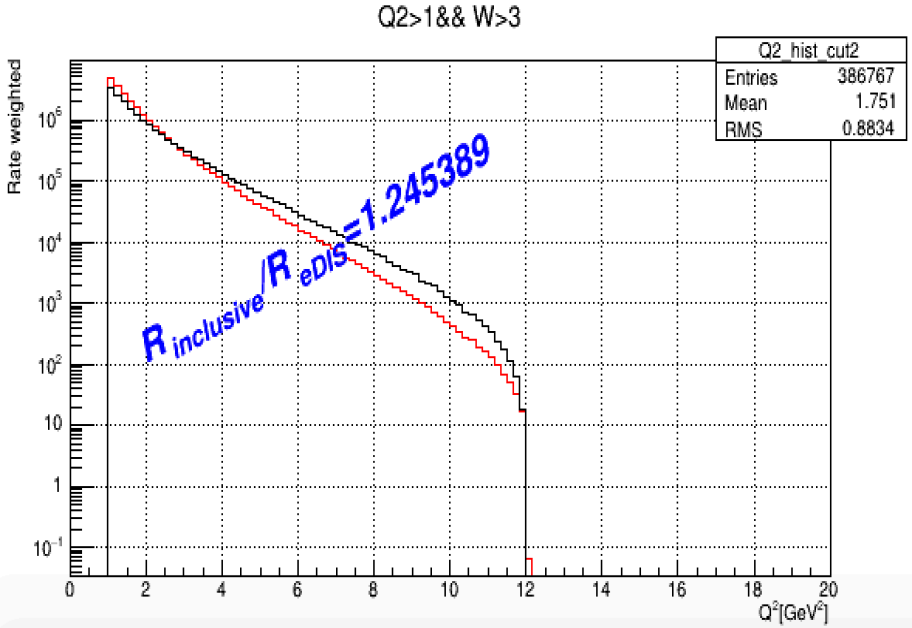


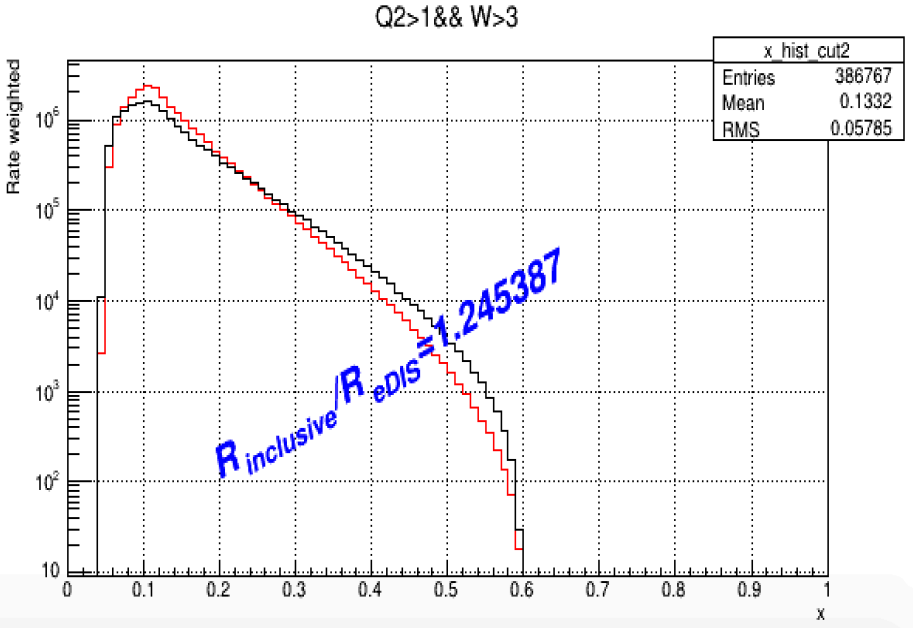
Rate Comparison for PVDIS LH2 target

Q2>1 and W>3 cuts



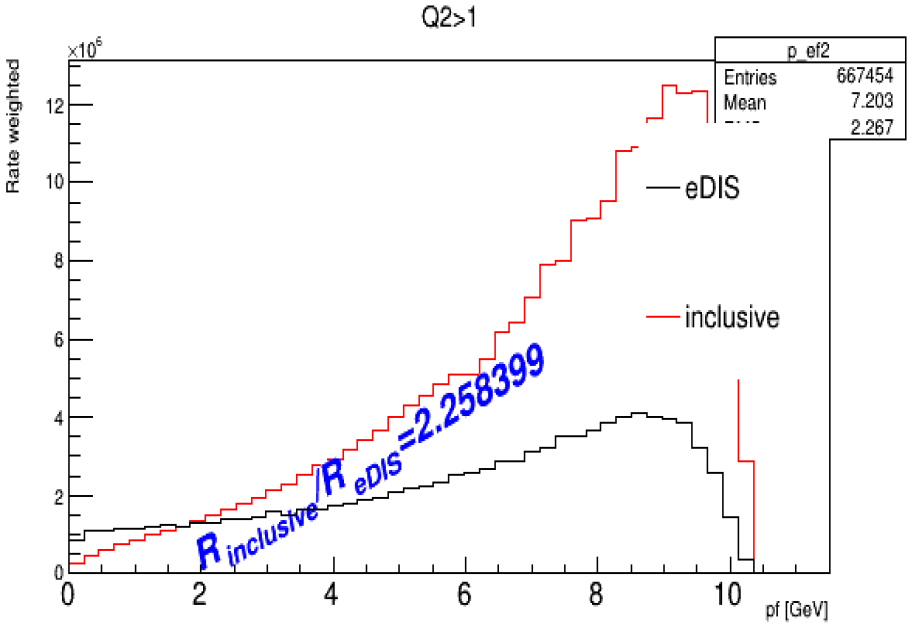


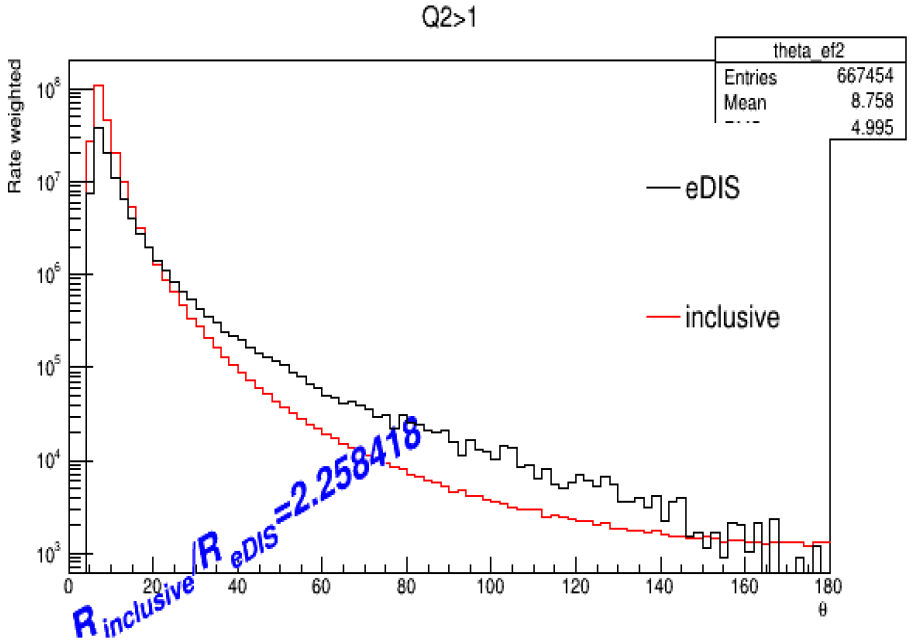


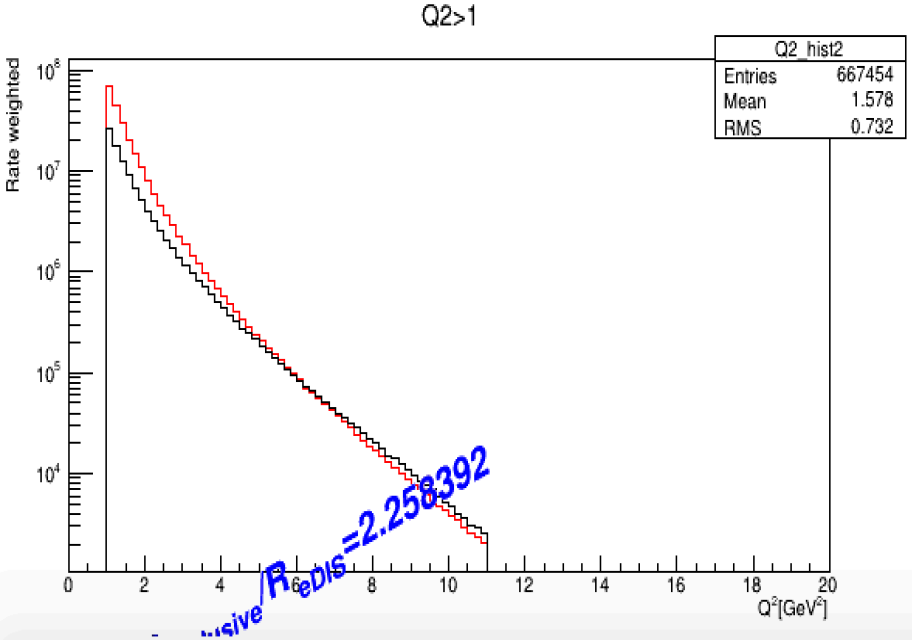


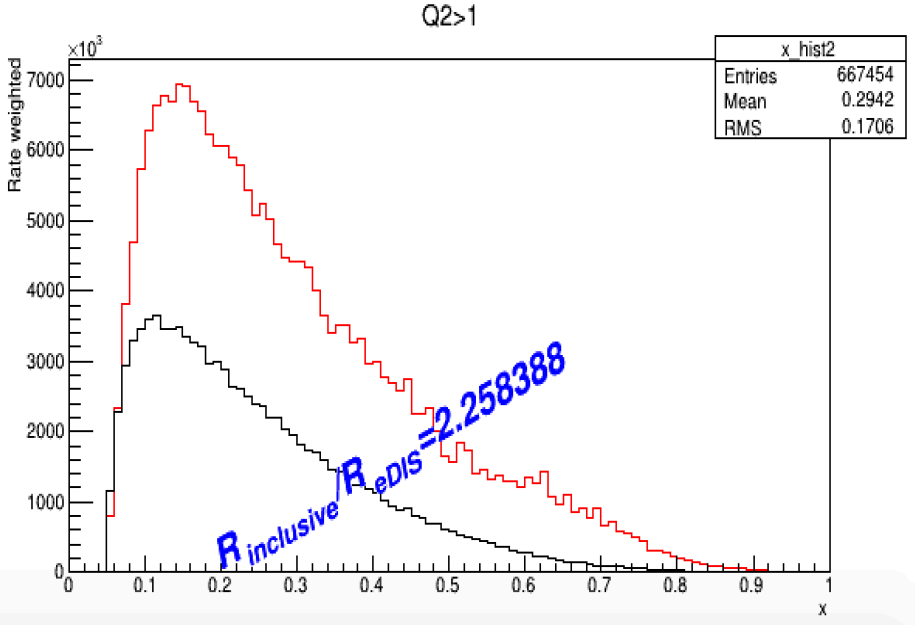
Rate Comparison for PVDIS LD2 target

Q2>1



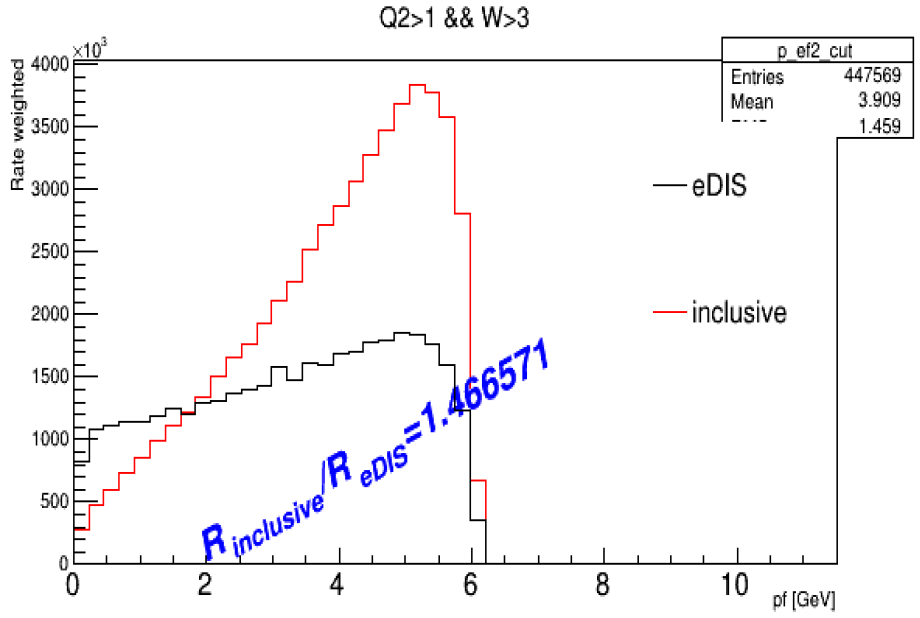


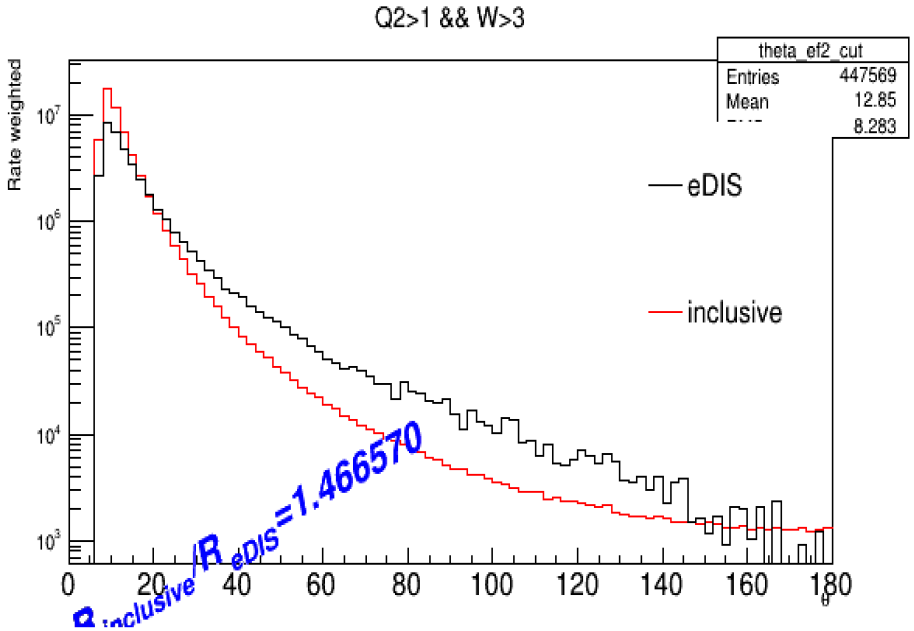


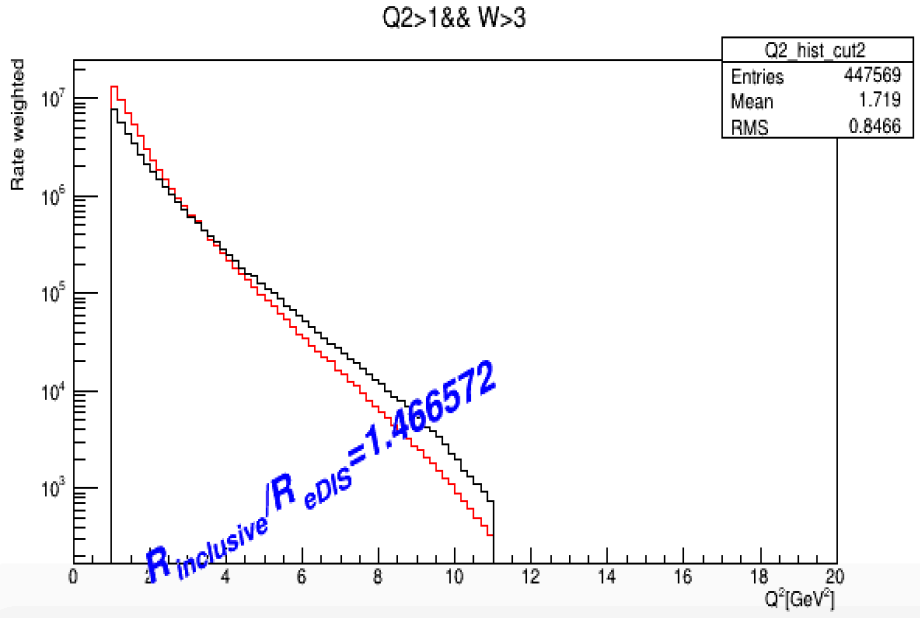


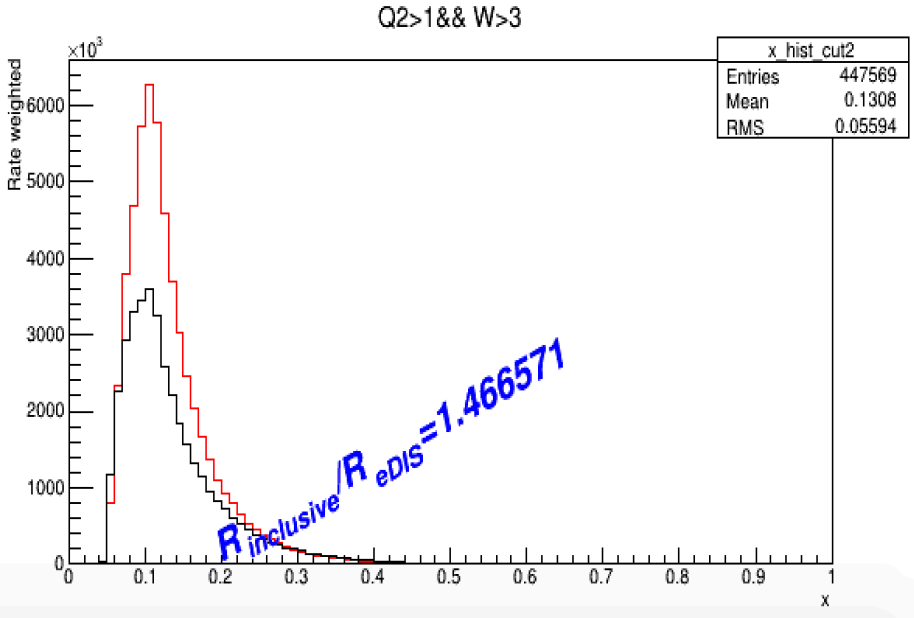
Rate Comparison for PVDIS LD2 target

Q2>1 and W>3 cuts



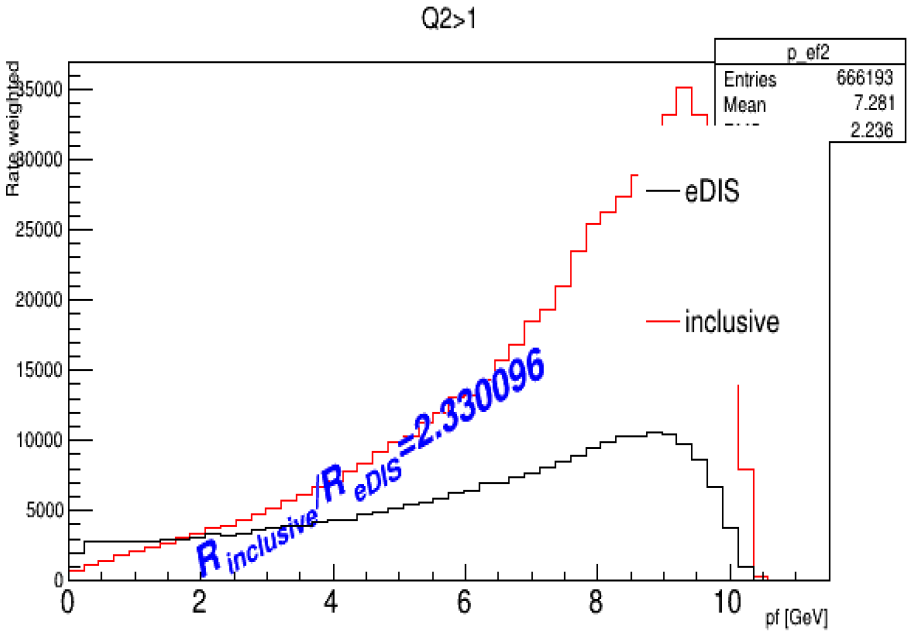


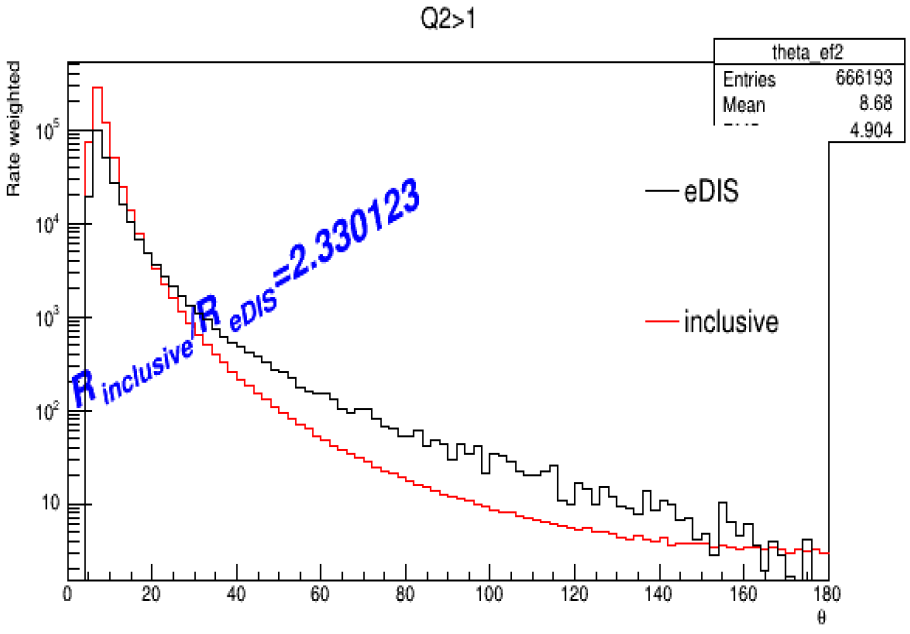


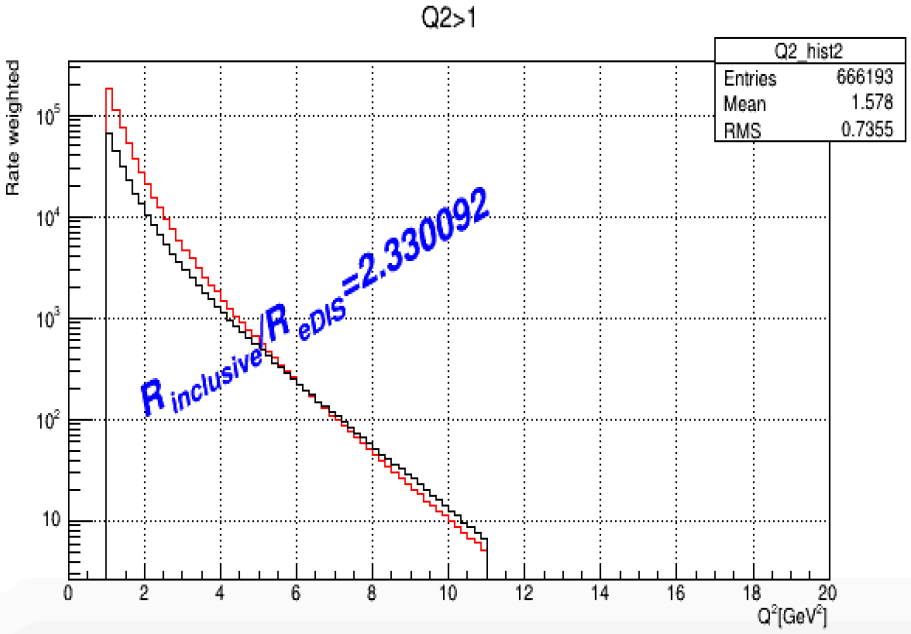


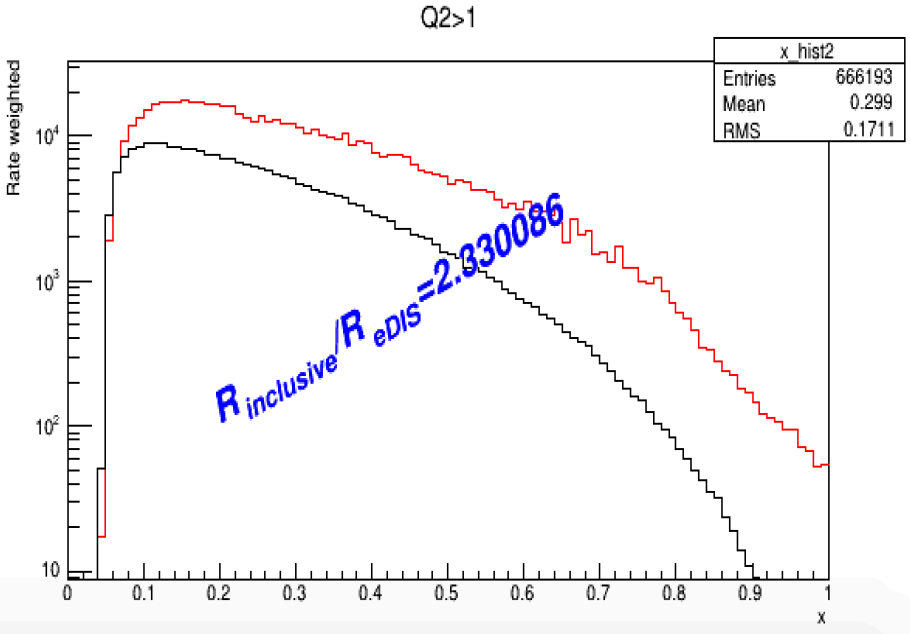
Rate Comparison for SIDIS 3He target

Q2>1



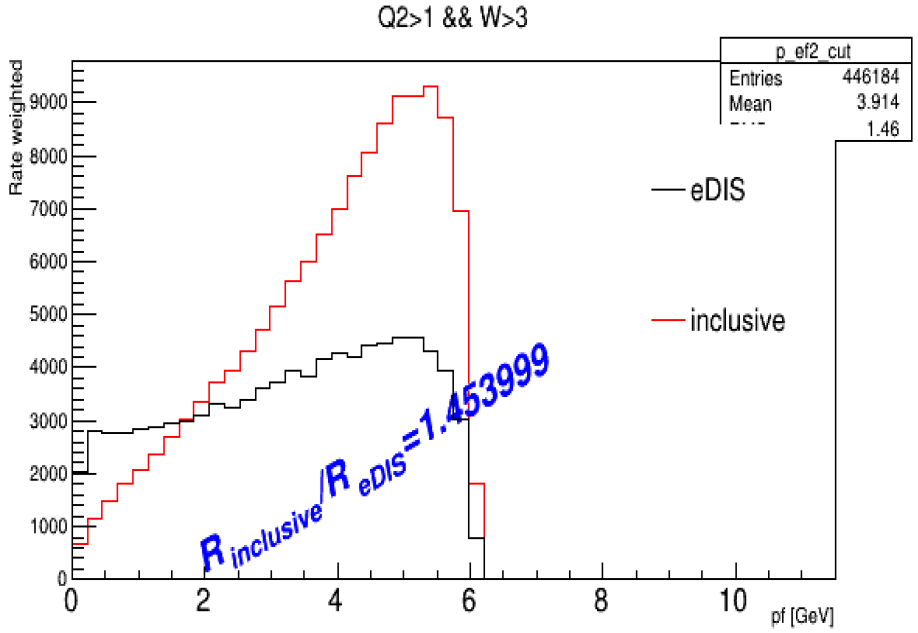


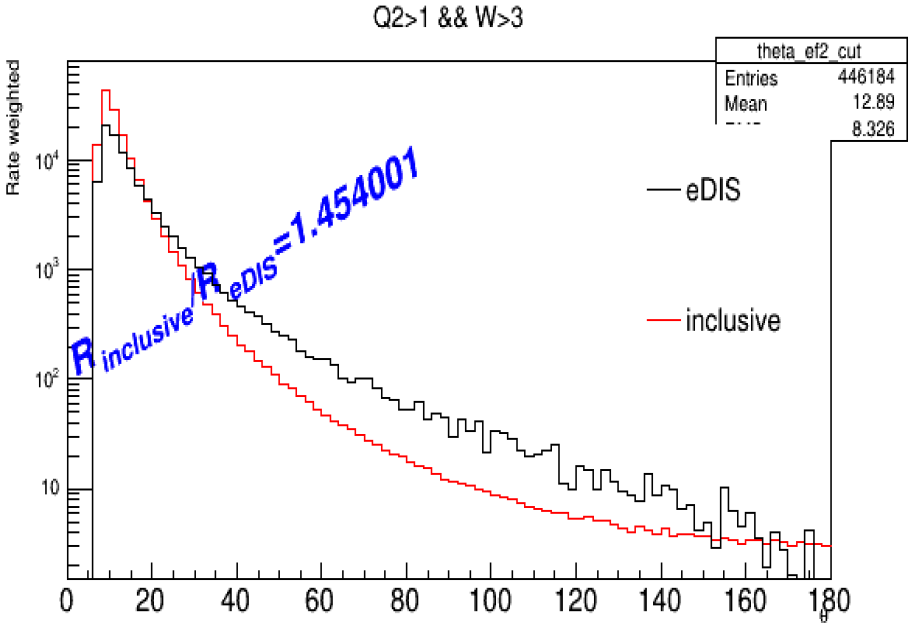


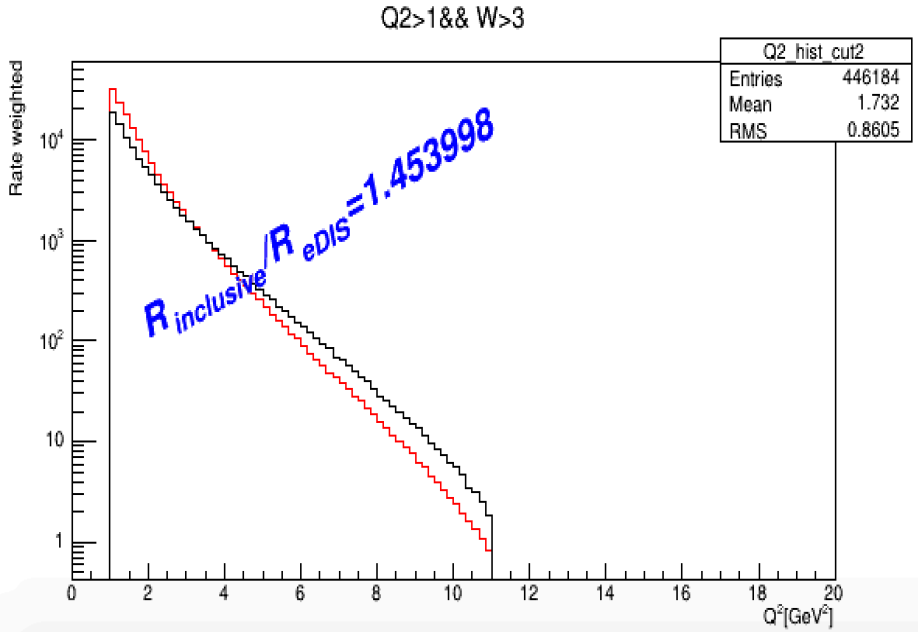


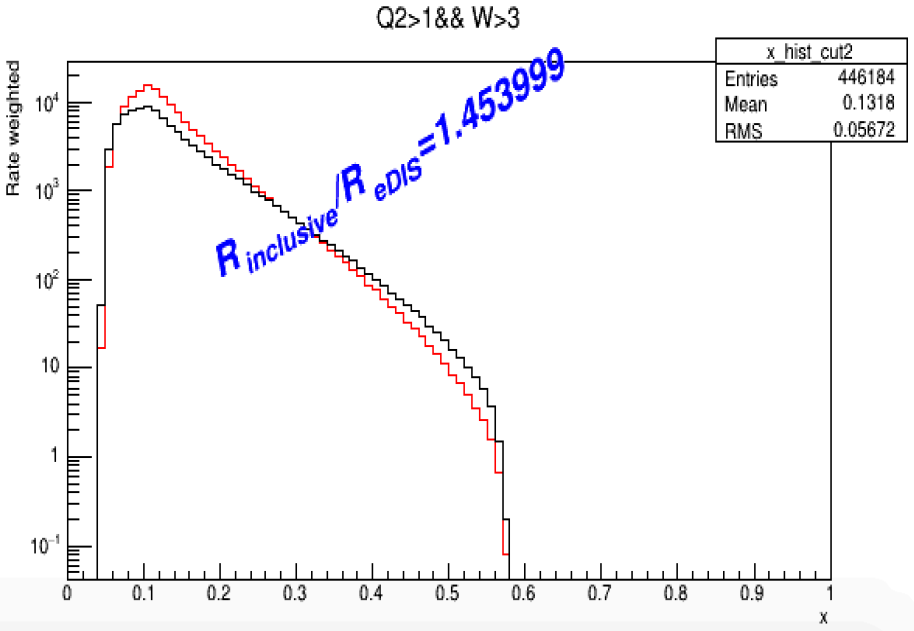
Rate Comparison for SIDIS 3He target

Q2>1 and W>3 cuts









Rate Comparison

No window	eDIS			solid_inclusive_e		
Single e trigger Rate (kHz)	FAEC	FAEC +LGC	FAEC+LGC+ SPD	FAEC	FAEC +LGC	FAEC+LGC +SPD
No cuts	70.37	64.49	59.70	136.01	126.29	116.28
Q2>1; W>2	57.81	53.77	50.02	109.17	101.67	94.05
Q2>1; W>3.5	15.38	14.29	13.48	23.62	22.05	20.70

PDF CT14: 138.398, 127.065, 116.964, 116.964

No window	eDIS		solid_inclusive_e	
Single e trigger Rate (kHz)	LAEC	FAEC+SPD	LAEC	FAEC+SPD
No cuts	4.5	4.1	5.7	5.2

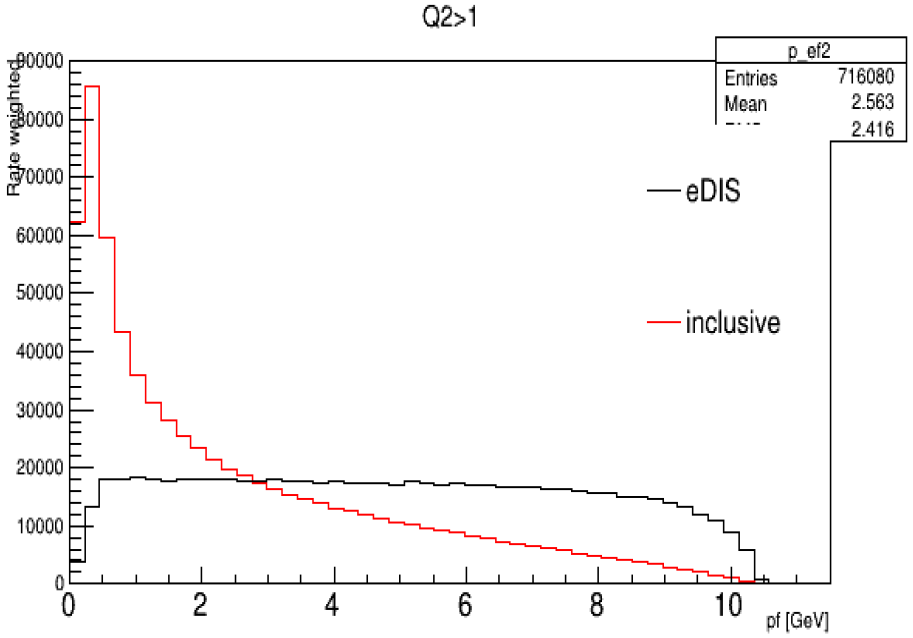
$(156.8+35-28.165-20.69) * 14596 * 1e^{3} * 30e^{-9} = 62.6\text{kHz}$

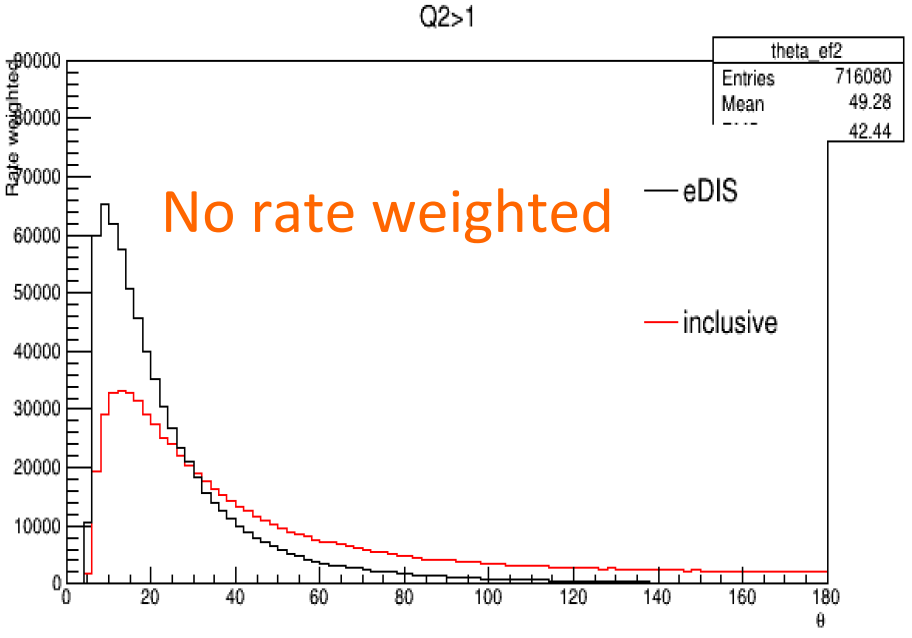
Total<111.4kHz

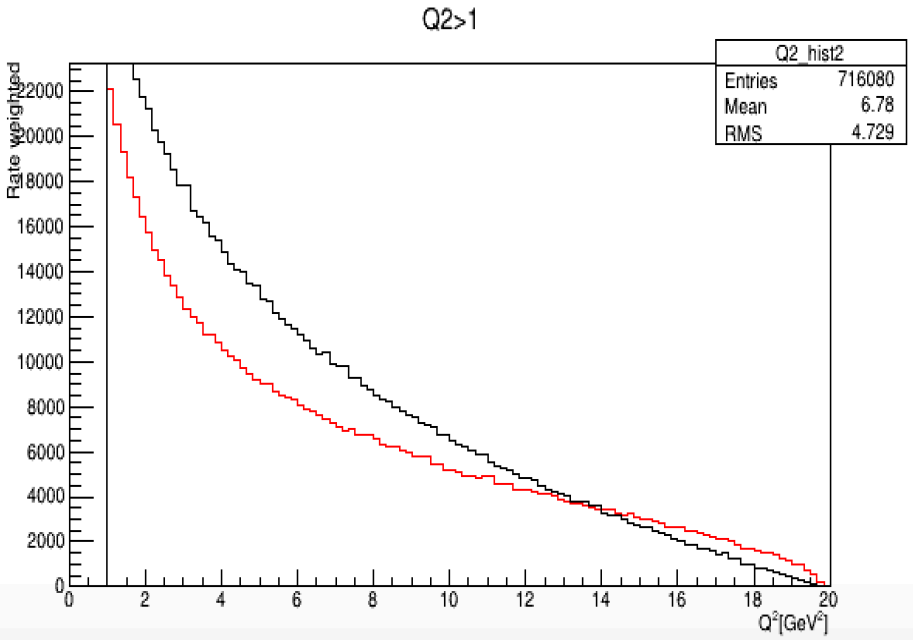
Backup

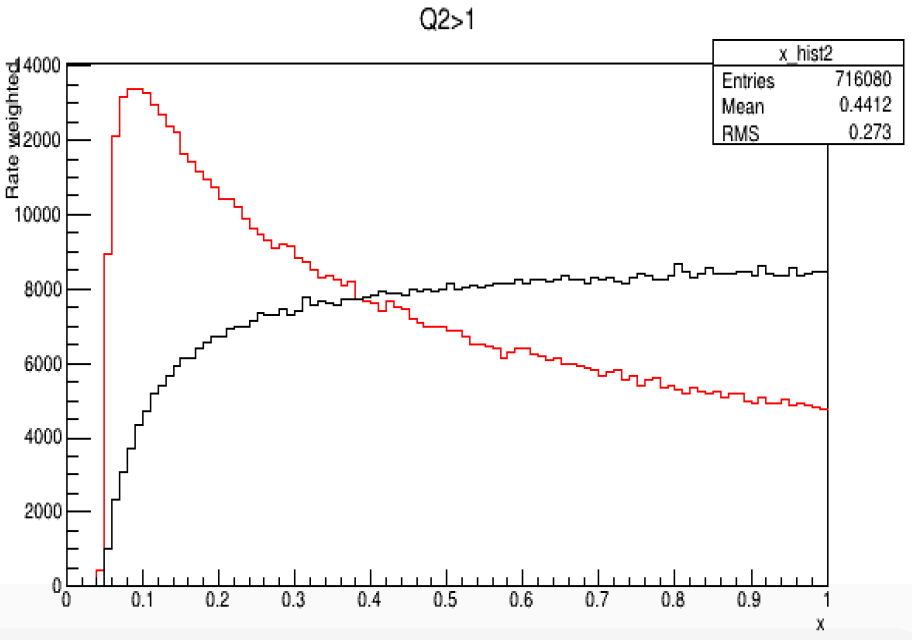
Rate Comparison for PVDIS LH2 target

Q2>1



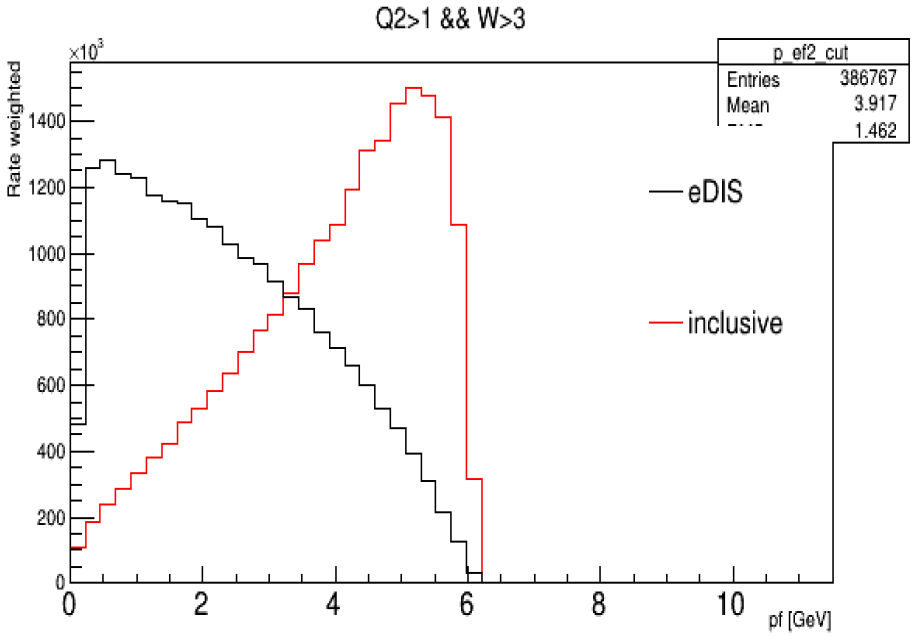


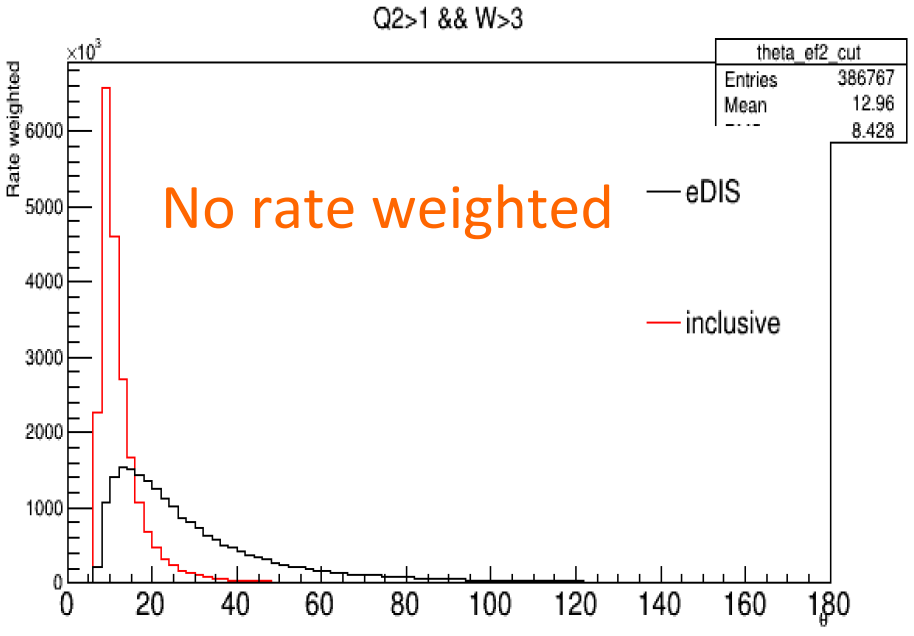


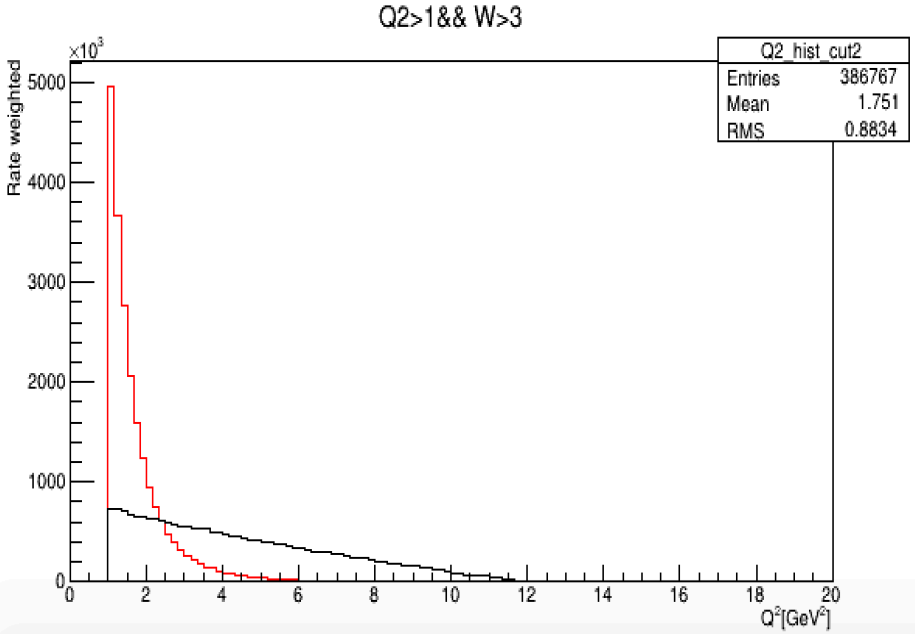


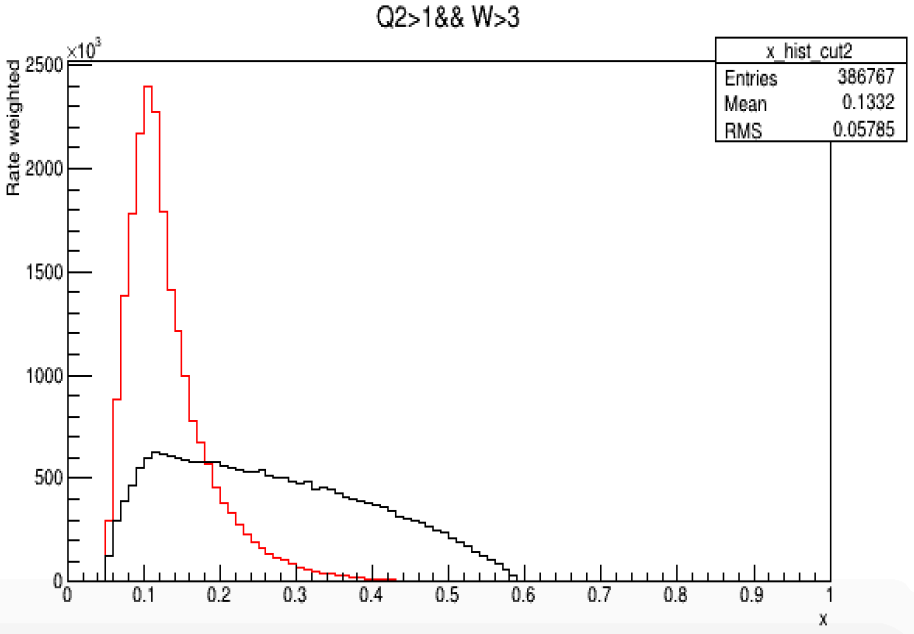
Rate Comparison for PVDIS LH2 target

Q2>1 W>3

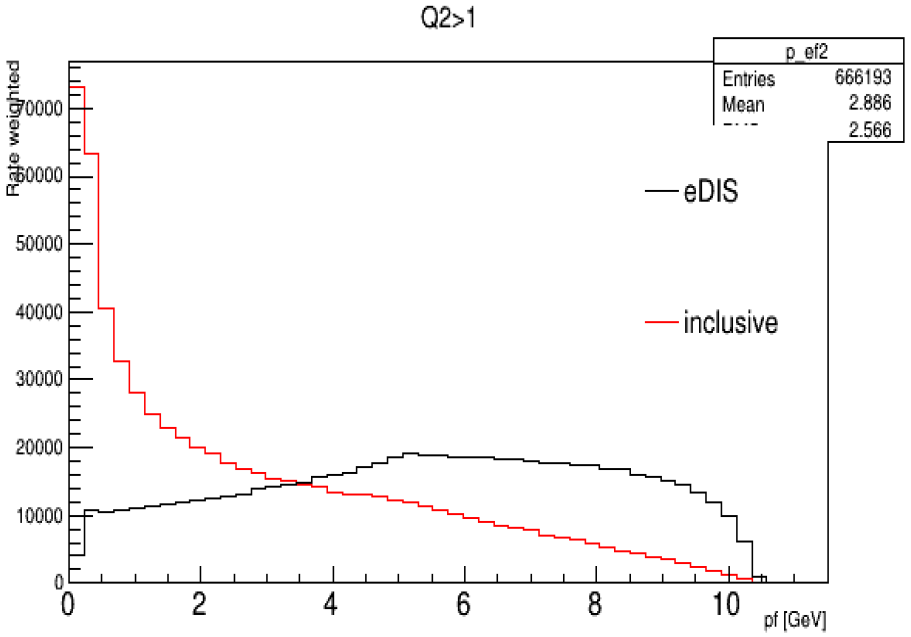


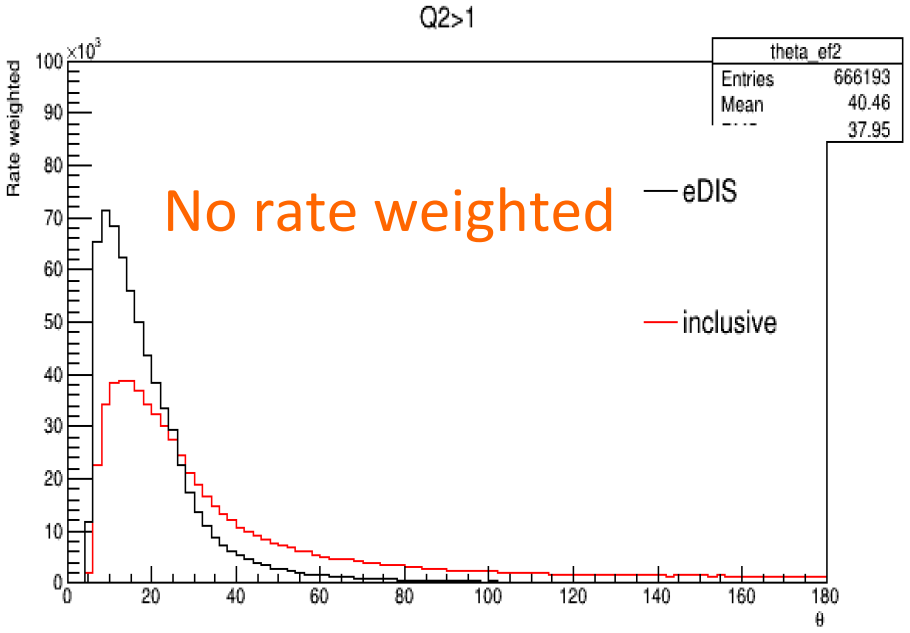


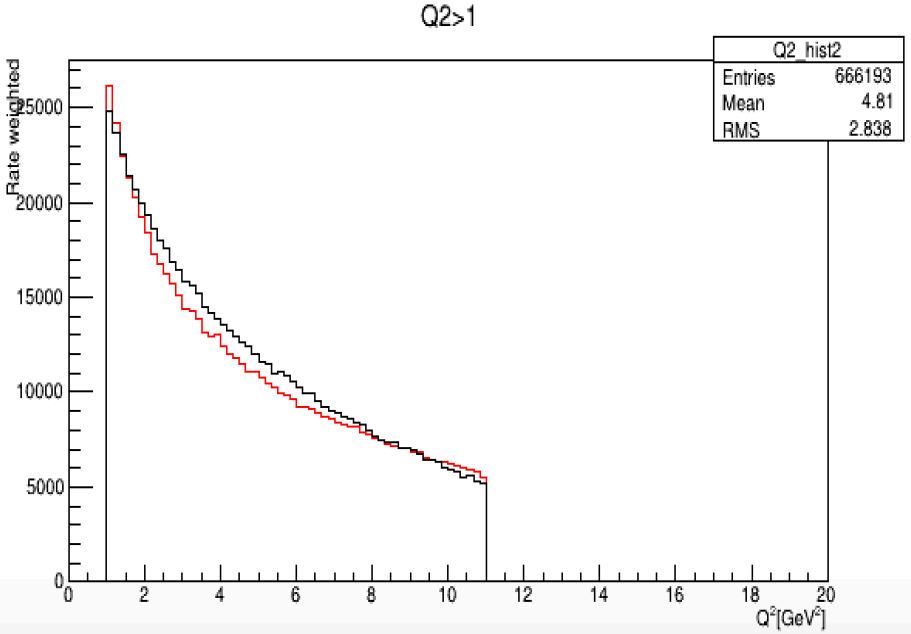


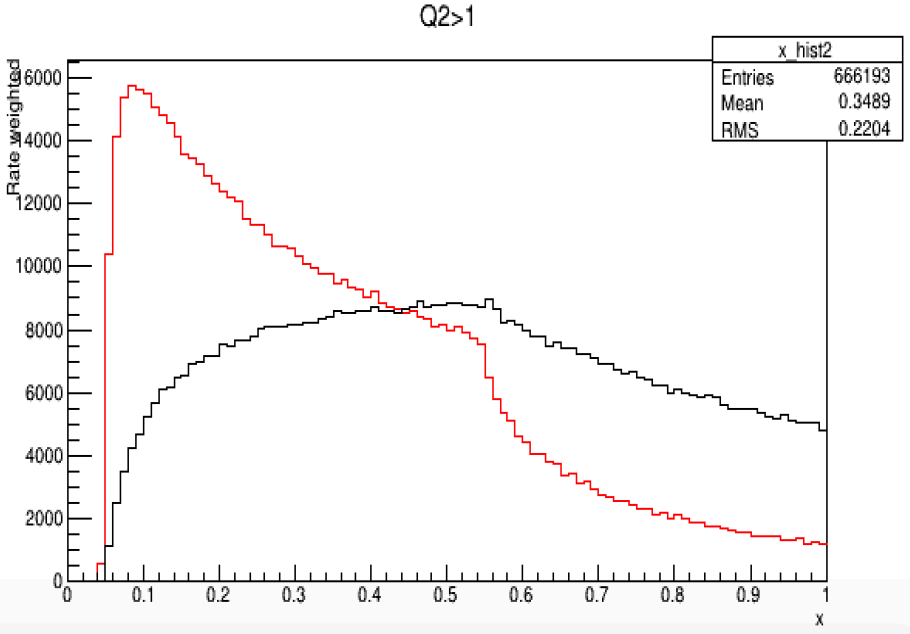


Kinematic Comparison for SIDIS 3He target Q2>1









Kinematic Comparison for SIDIS 3He target Q2>1 W>3