Inclusive Electron Rates from Peter Bosted Fit* and its comparison with current model**

Ziheng

*Referred as “PB” in this report

**Current model used in electron events generator, based on theory and cteq6 PDF fit, referred as “DIS” in this report

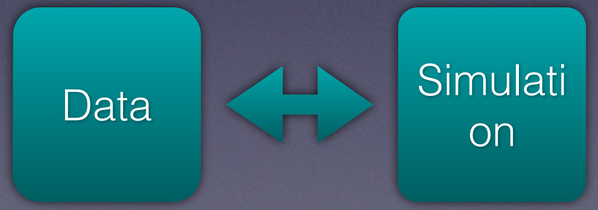
Outline

1	Transplant **Peter Bosted fit** to current software, an event generator.	**Successful**
2	Compare simulation results from **PB fit** and **current model** (“DIS”)	**Notable difference**
3	Search for the source of discrepancy	Just started

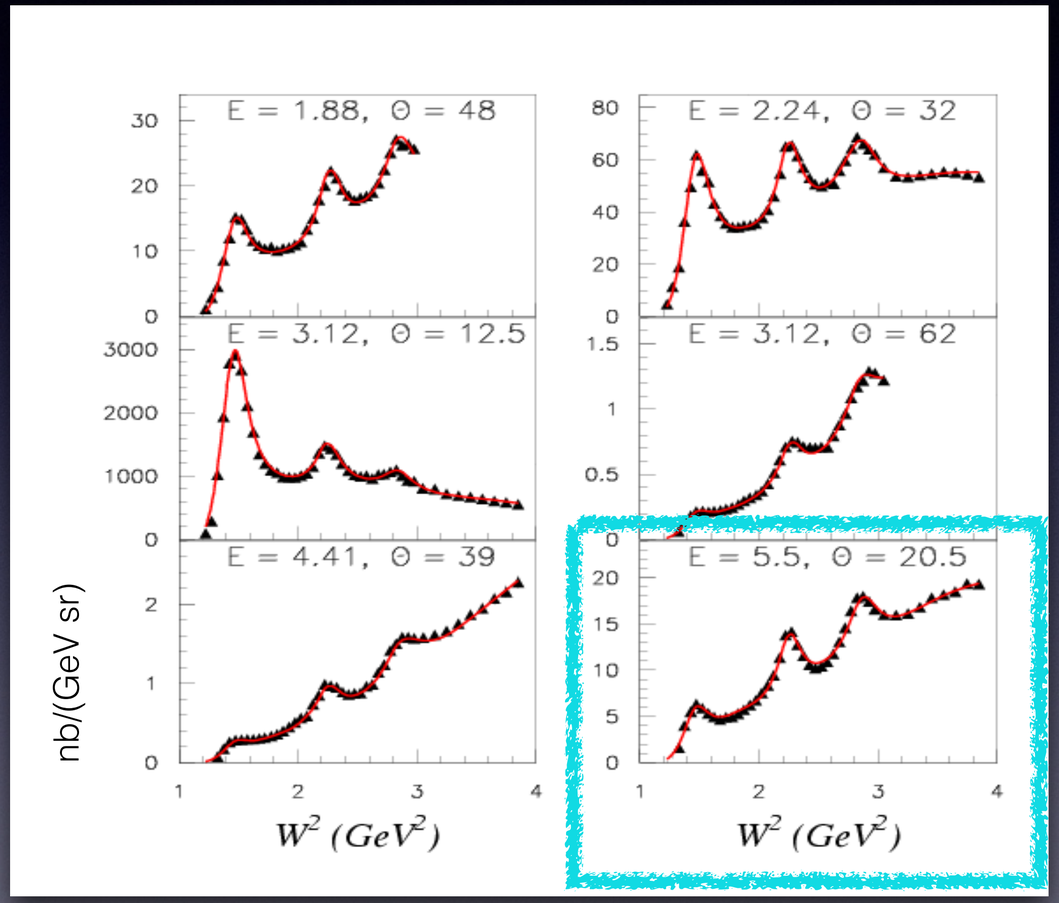
1. Transplant PB fit to current Event Generator

2. Simulate inclusive events, using different nucleus

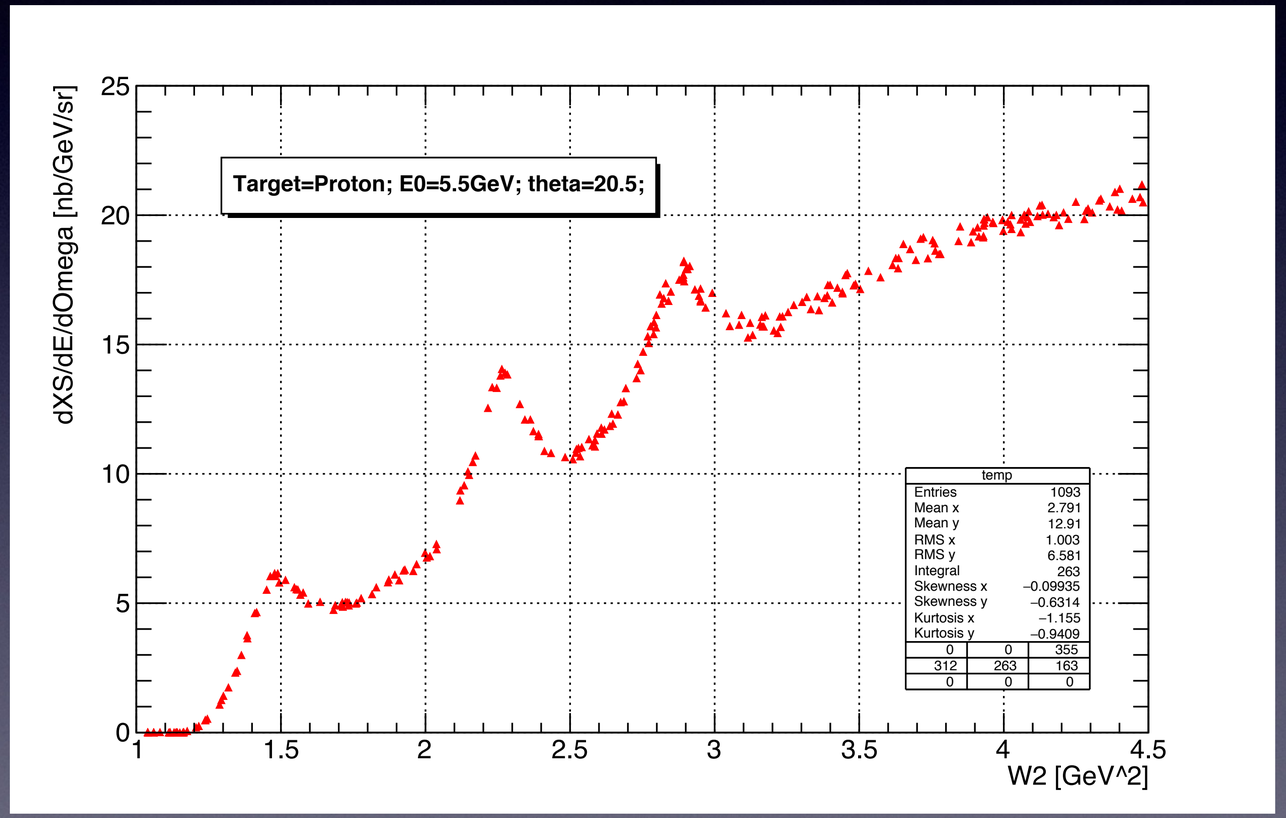
3. Compare produced simulation with data, to verify the software developing.



Proton Target

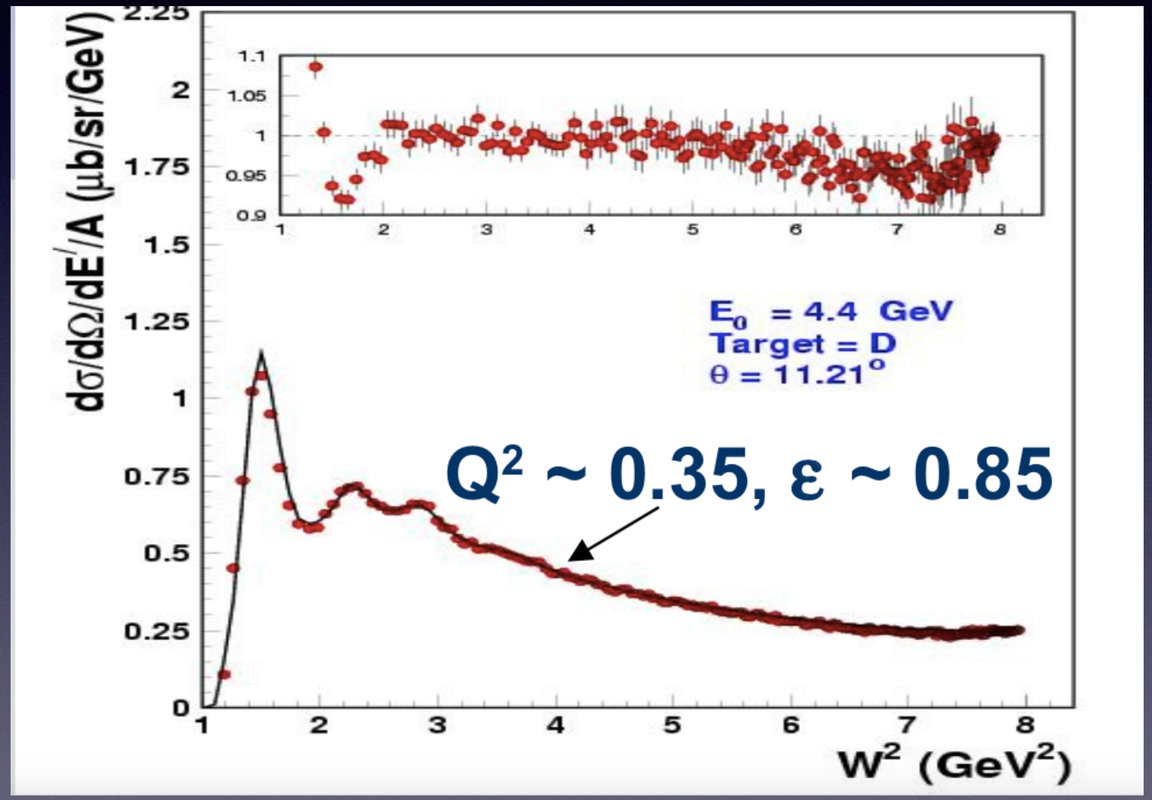


Data (JLab E94-110)

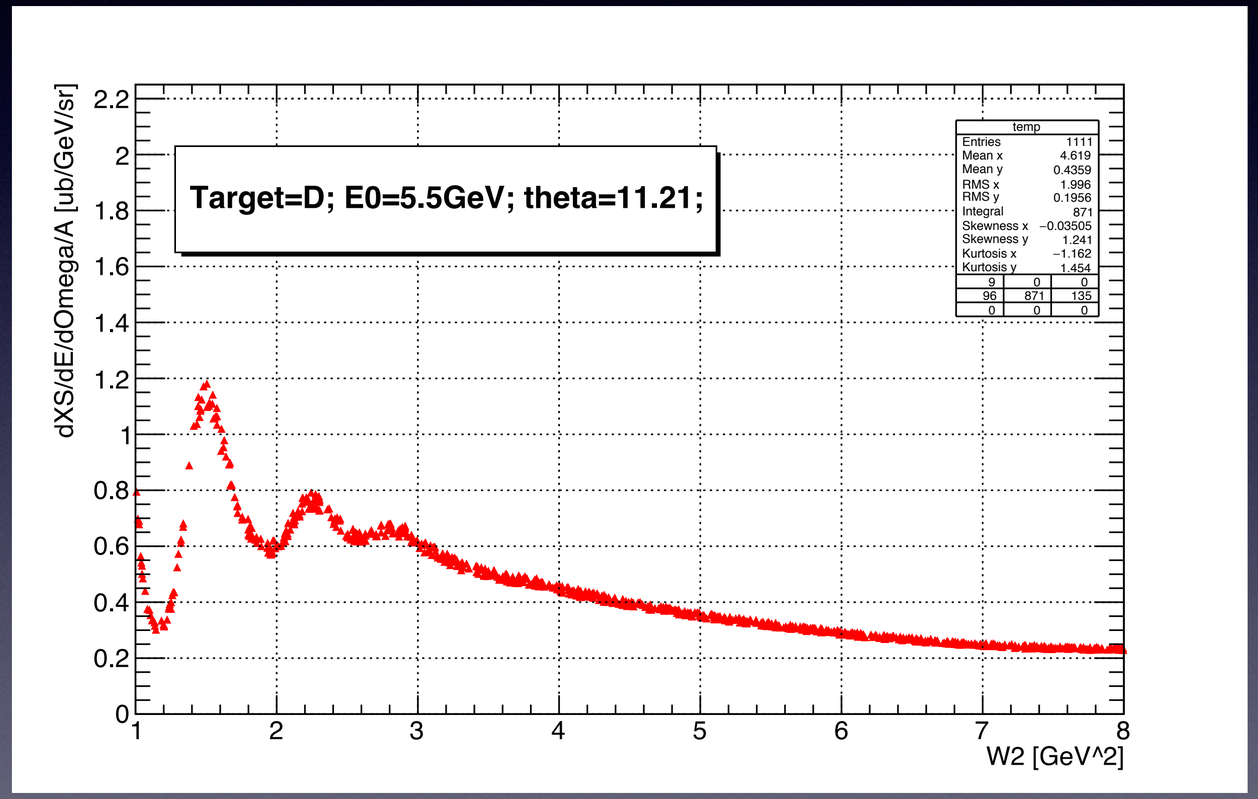


Data from EventGenerator_PB

Deuteron Target

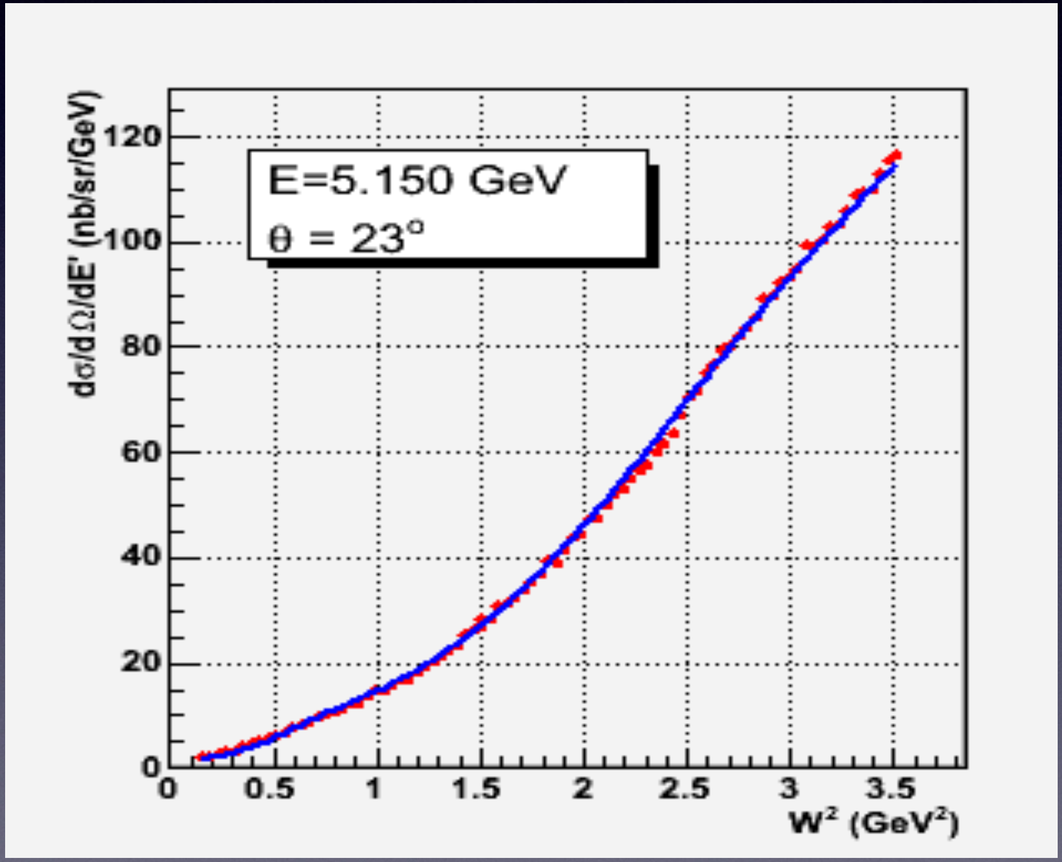


Data (JLab E00-002)

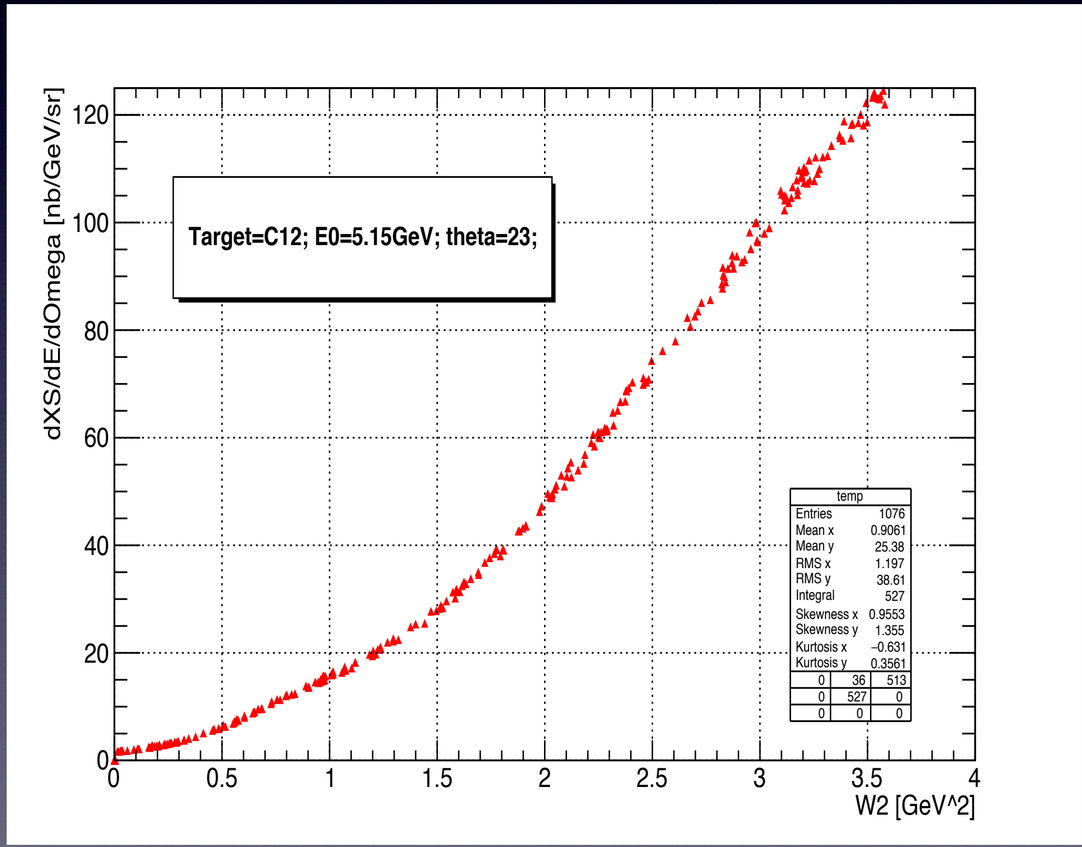


Data from EventGenerator_PB

Carbon Target

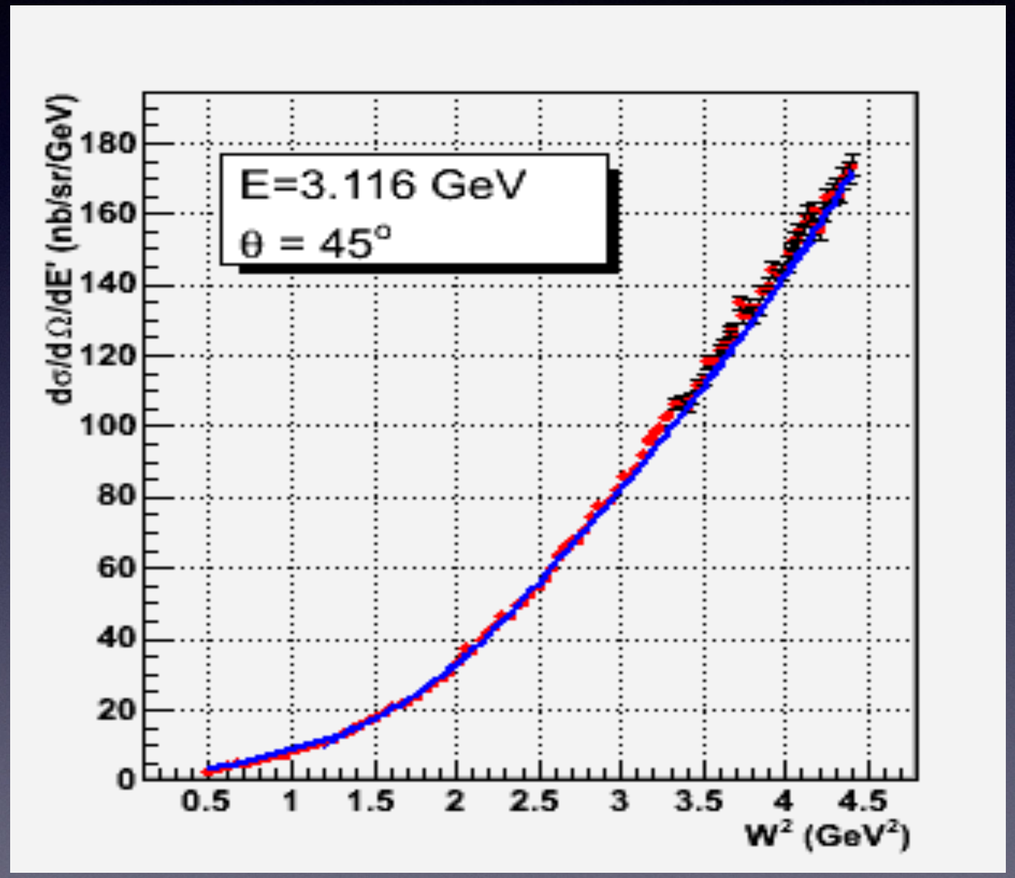


Data (JLab E06-109)

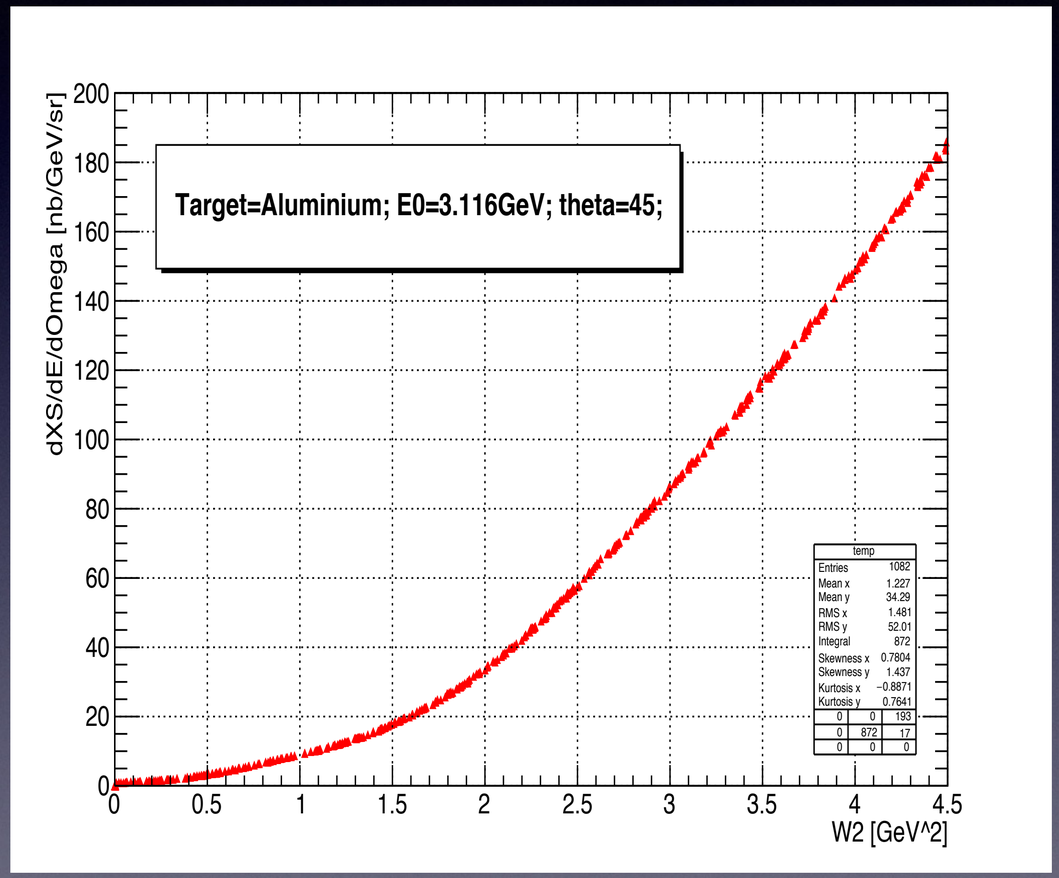


Data from EventGenerator_PB

Aluminum Target

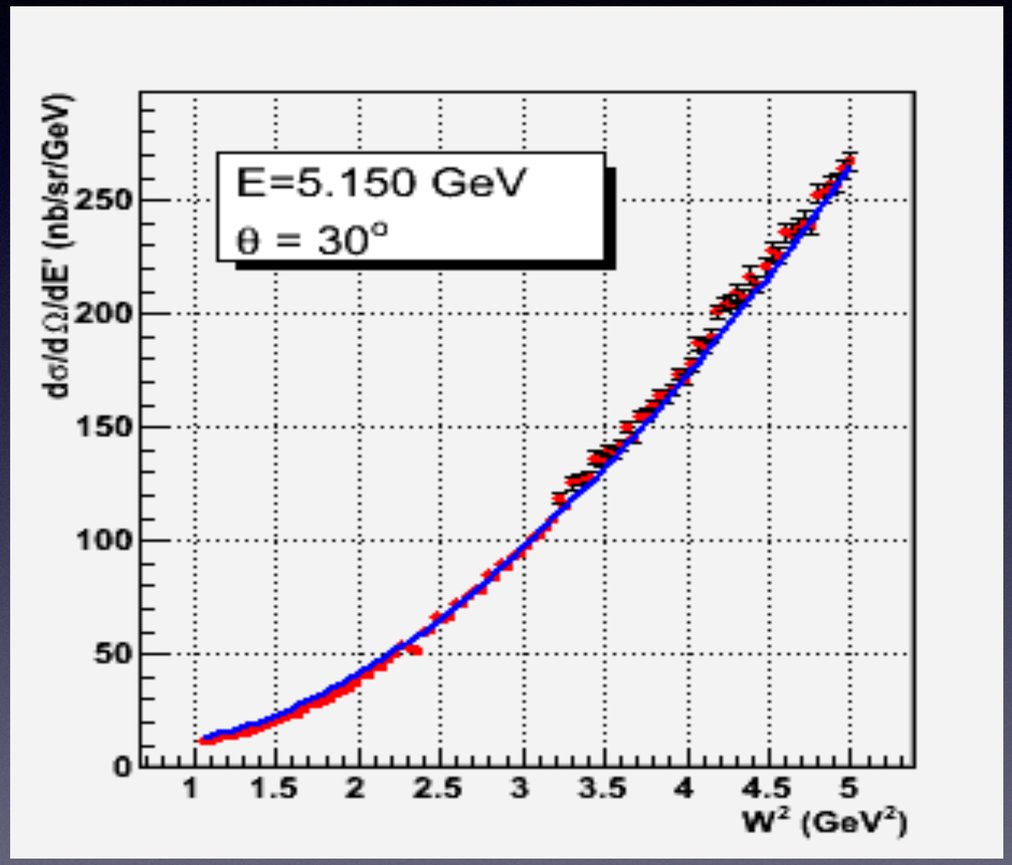


Data (JLab E06-109)

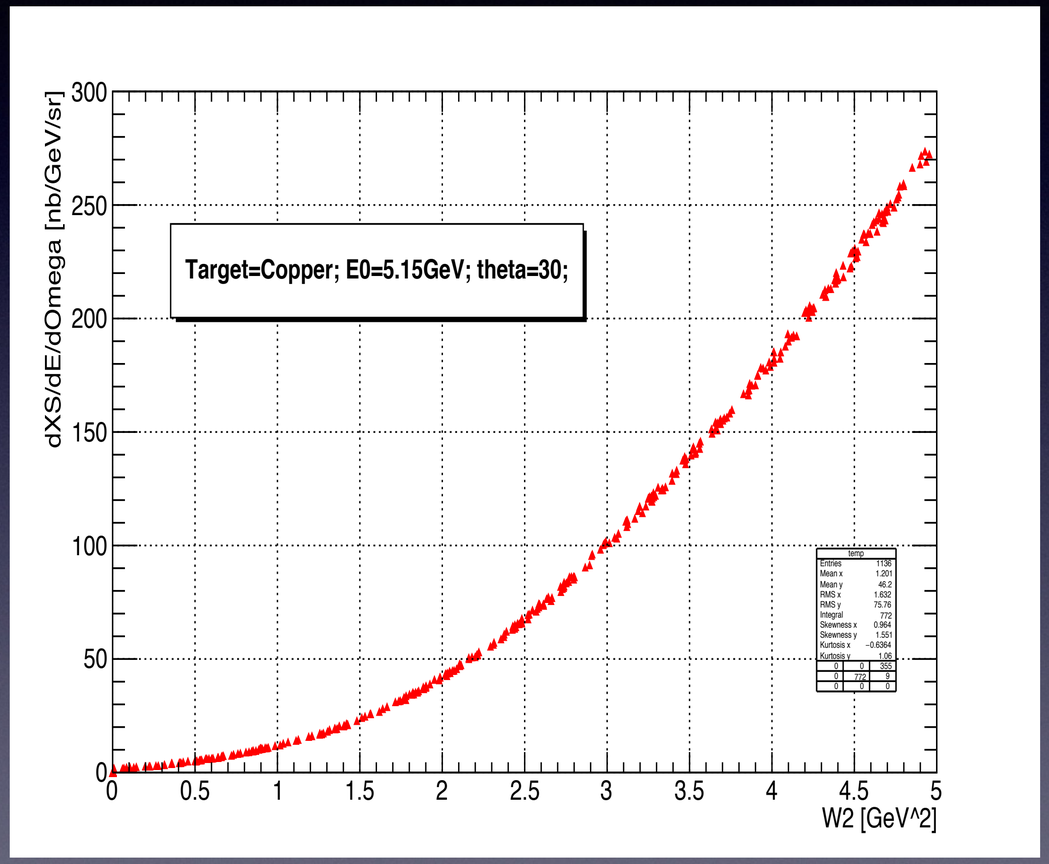


Data from EventGenerator_PB

Copper Target

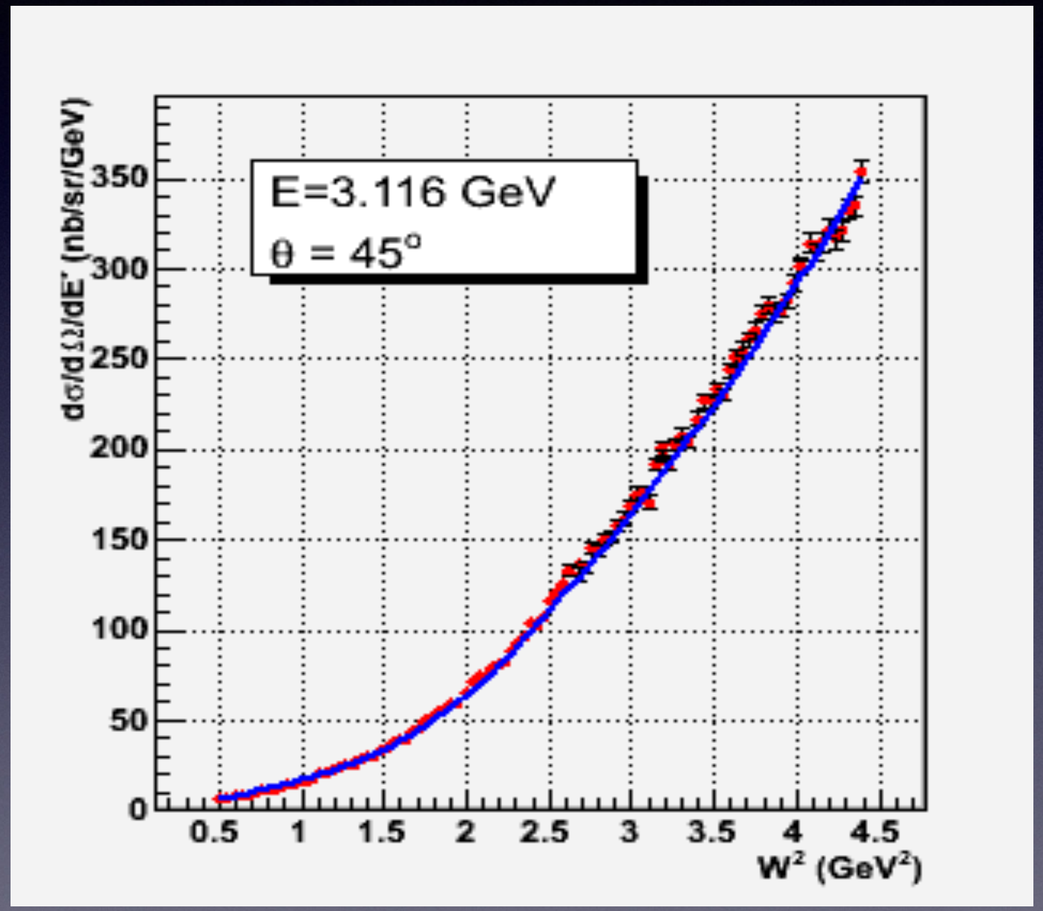


Data (JLab E06-109)

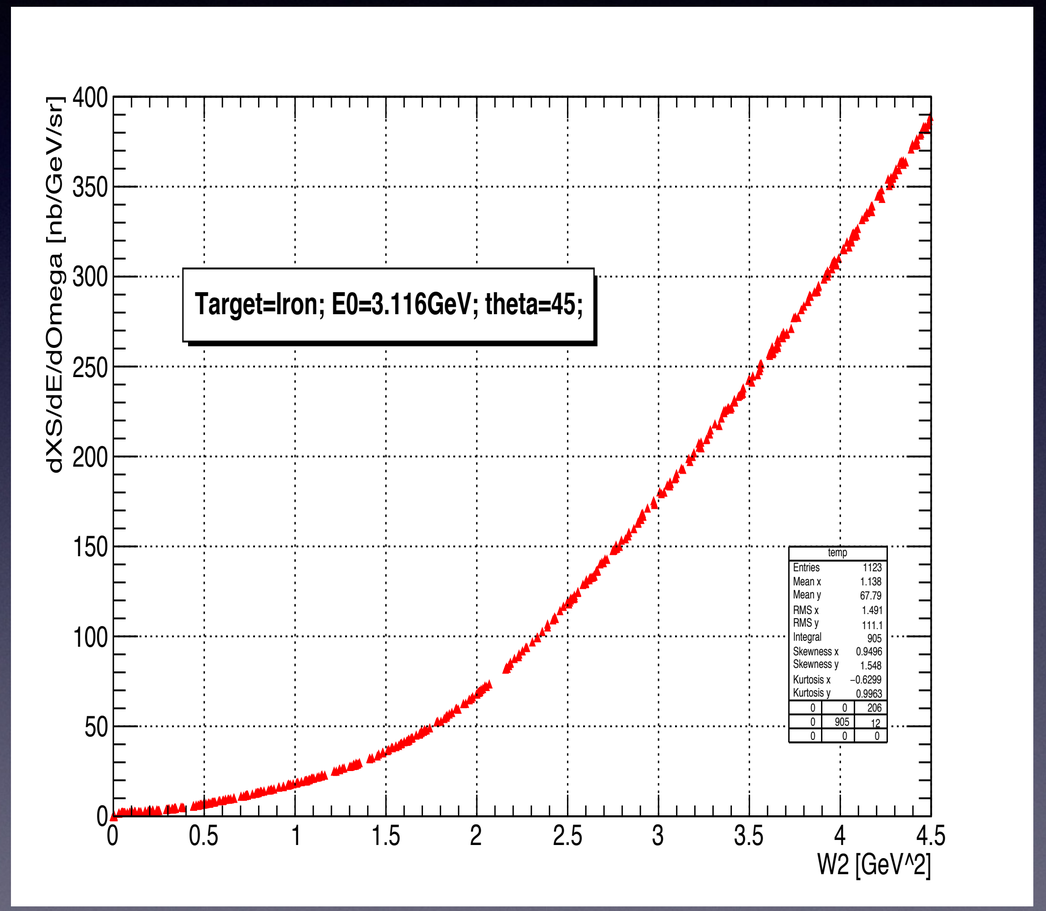


Simulation from software with PB

Iron Target

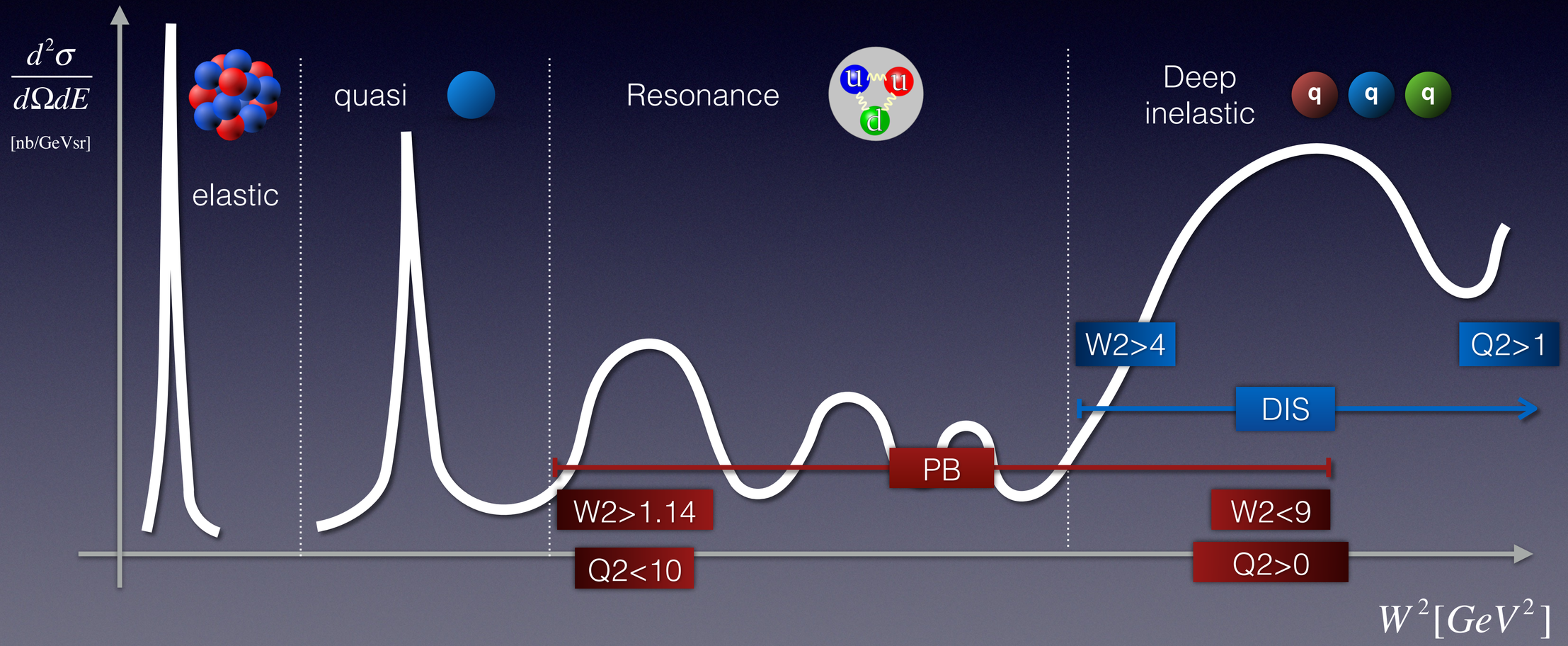


Data (JLab E06-109)



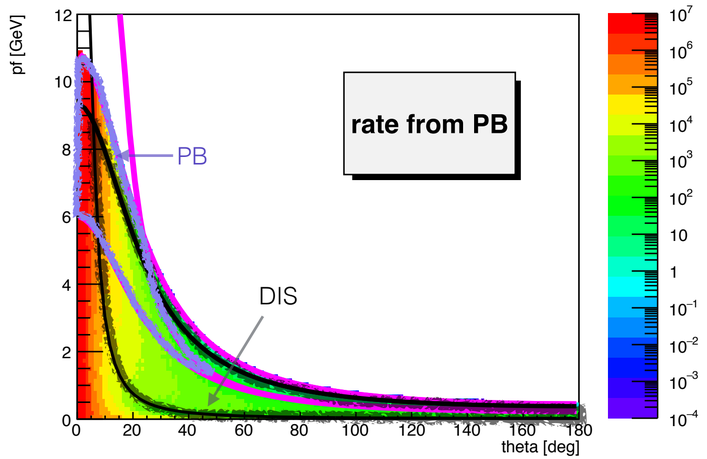
Simulation from software with PB

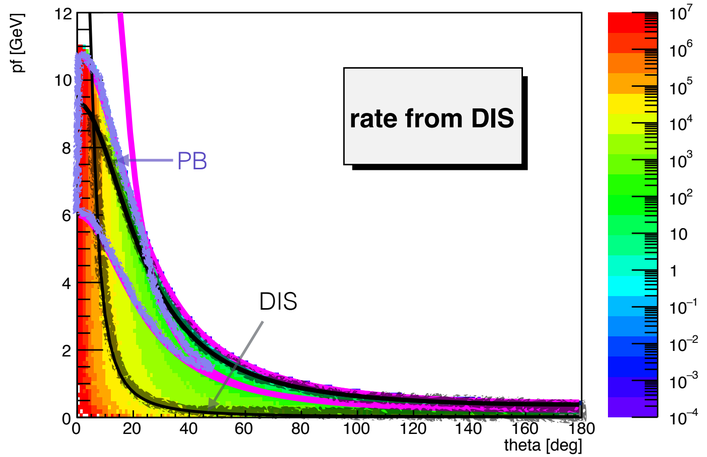
DIS vs PB

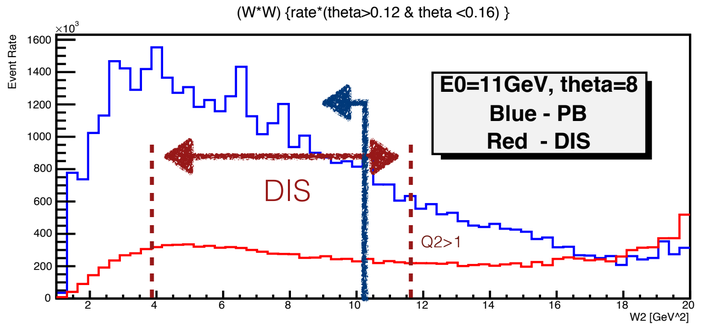

$\frac{d^2\sigma}{d\Omega dE}$
[nb/GeVsr]
elastic
quasi
Resonance
u
u
d
Deep
inelastic
q
q
q
W2>4
Q2>1
DIS
PB
W2>1.14
Q2<10
W2<9
Q2>0
$W^2[GeV^2]$

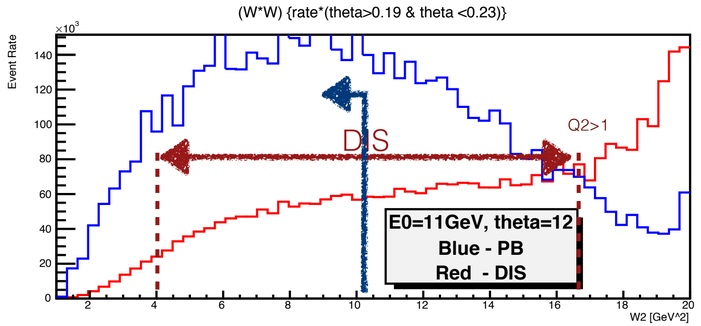
PVDIS LH2		PB	PVDIS H: rate from **PB**	PVDIS H: rate from **DIS**	**rate_PB/rate_DIS**
PVDIS LD2			PVDIS D: rate from **PB**	PVDIS D: rate from **DIS**	**rate_PB/rate_DIS**
JPsi LH2		DIS	JPsi H: rate from **PB**	JPsii H: rate from **DIS**	**rate_PB/rate_DIS**
SIDIS He3			SIDIS He3: rate from **PB**	SIDIS He3: rate from **DIS**	**rate_PB/rate_DIS**

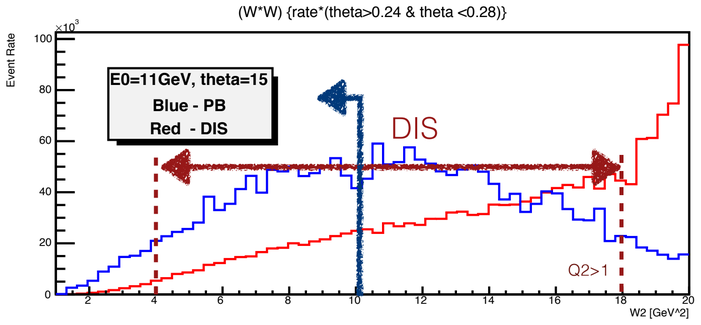
PVDIS H2 target at E0=11GeV

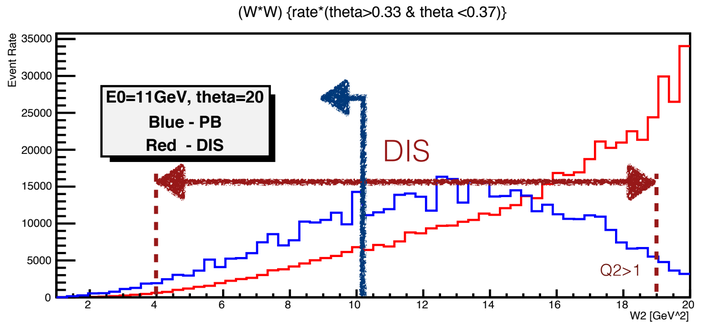


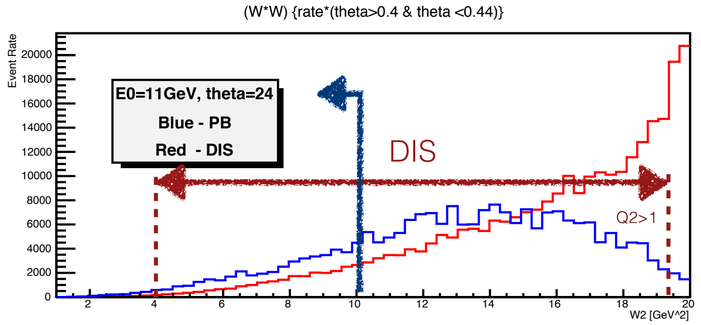


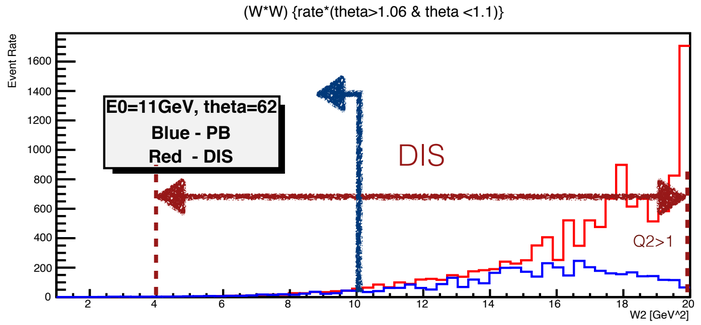




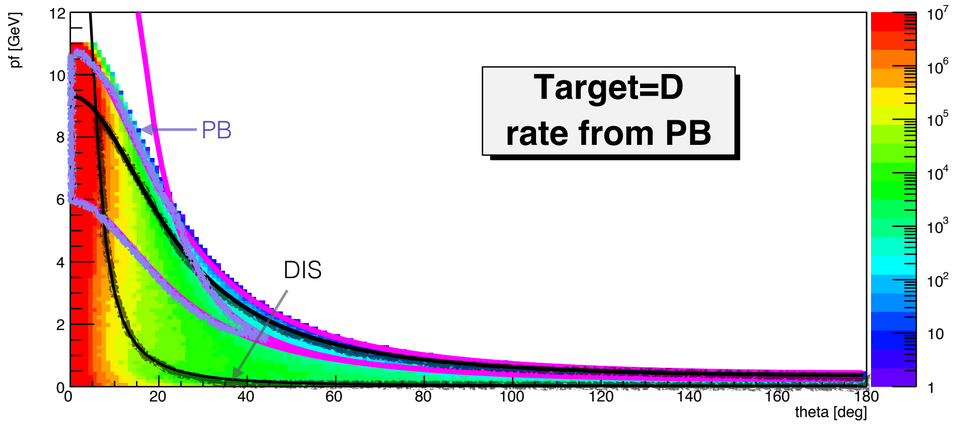


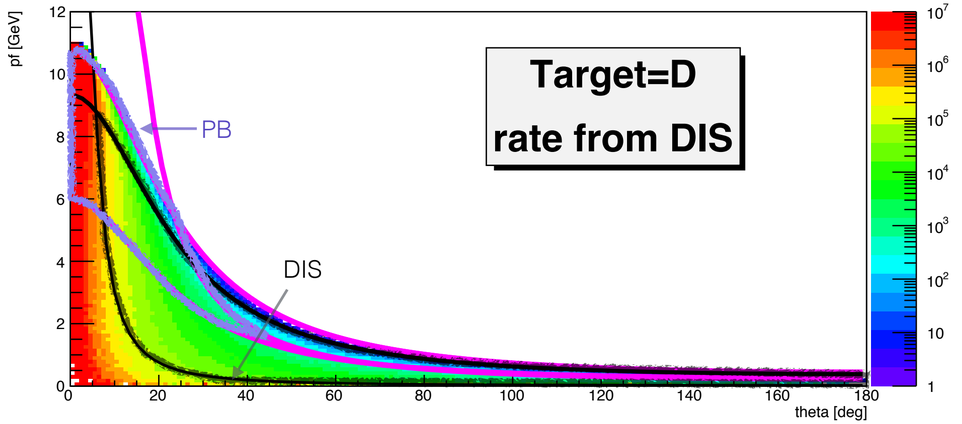


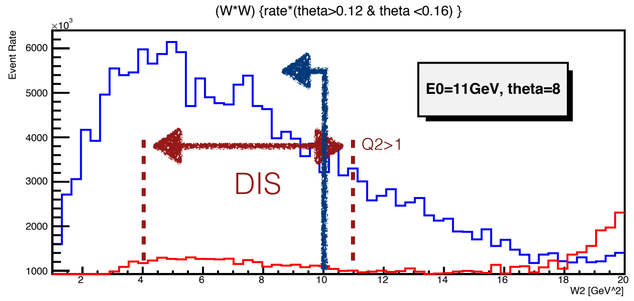


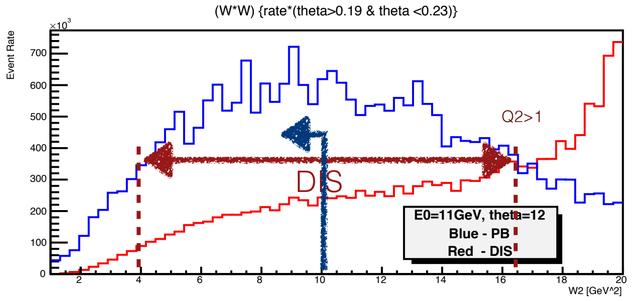


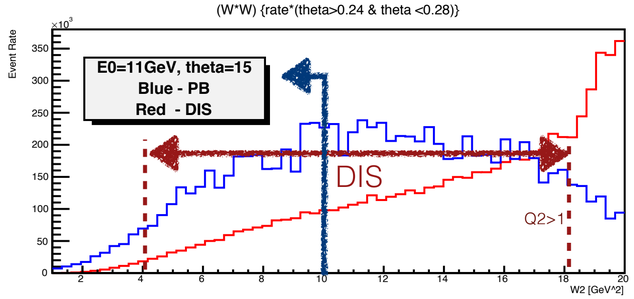
PVDIS D2 target at E0=11GeV

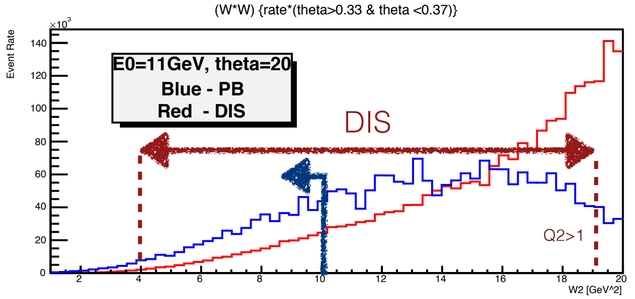


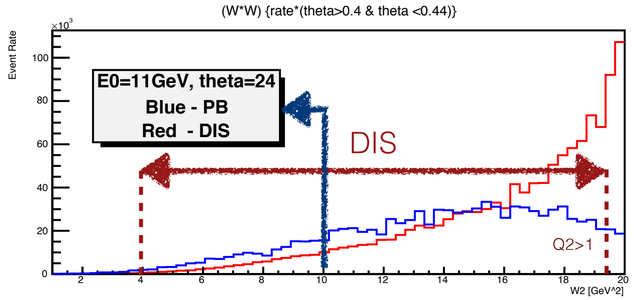


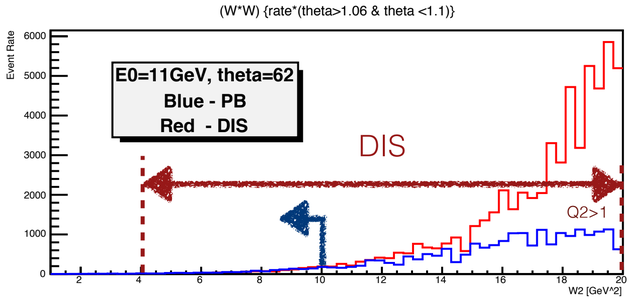




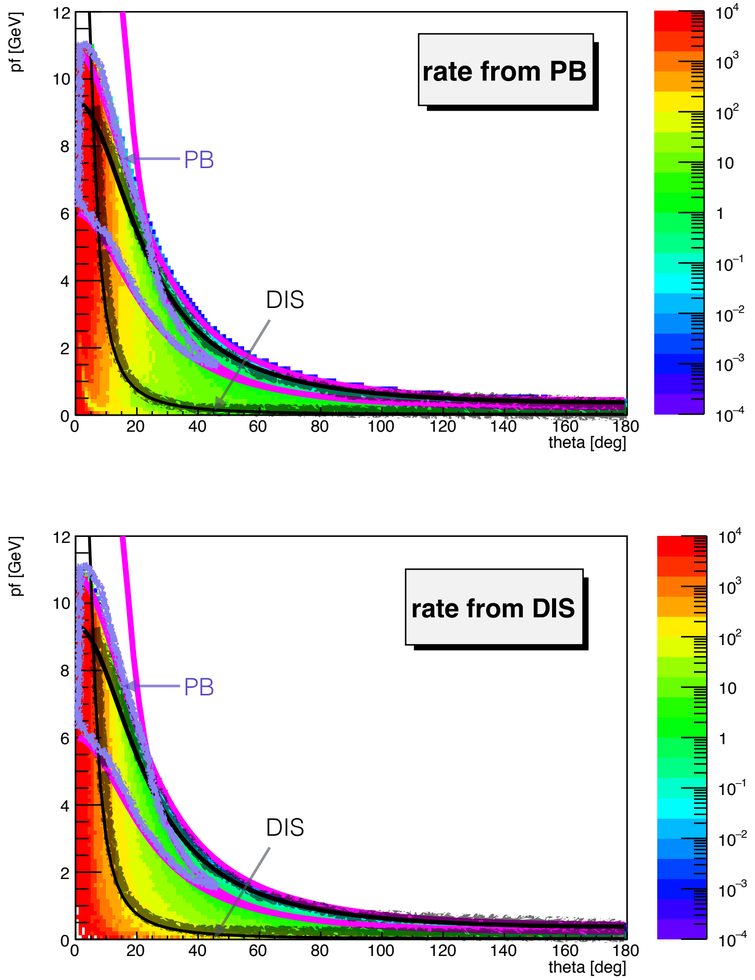


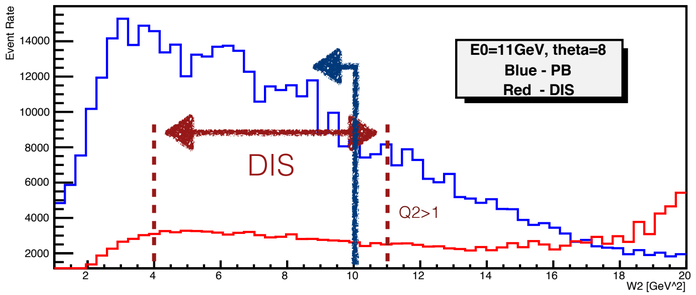


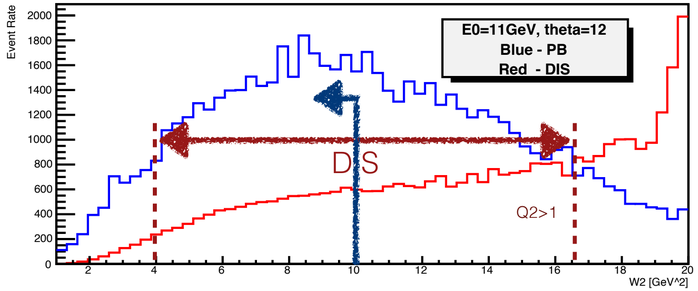


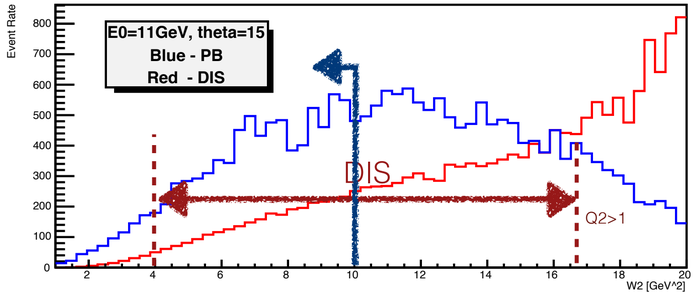


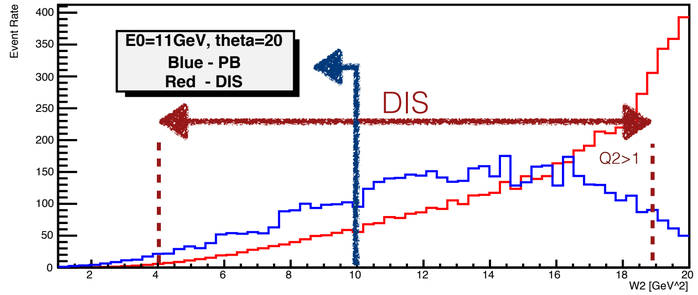
SIDIS He3 target at E0=11GeV

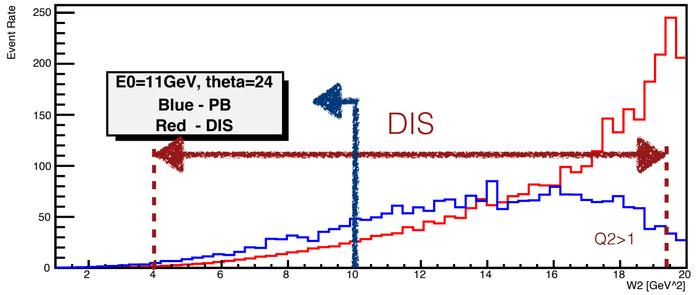


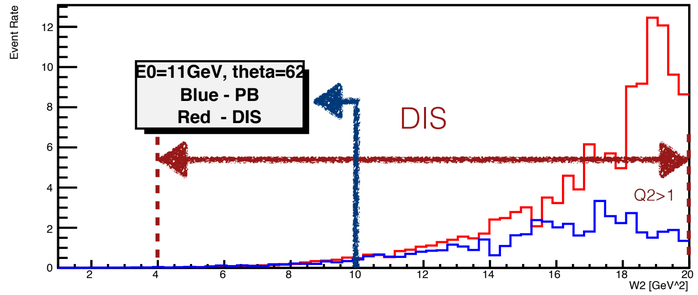




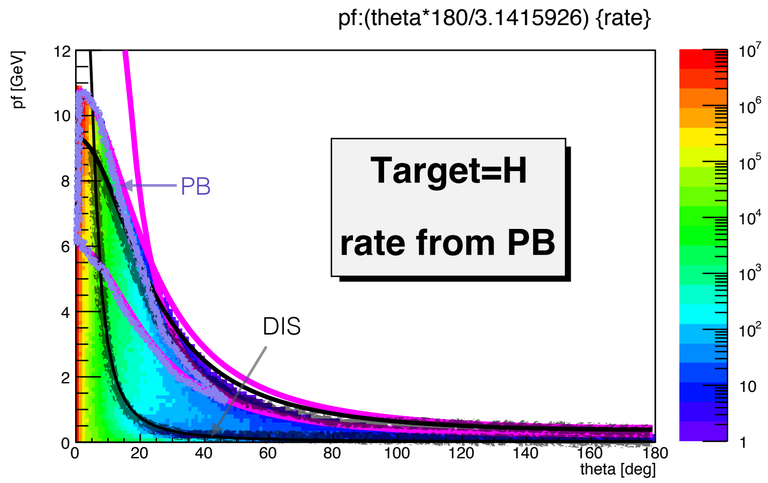


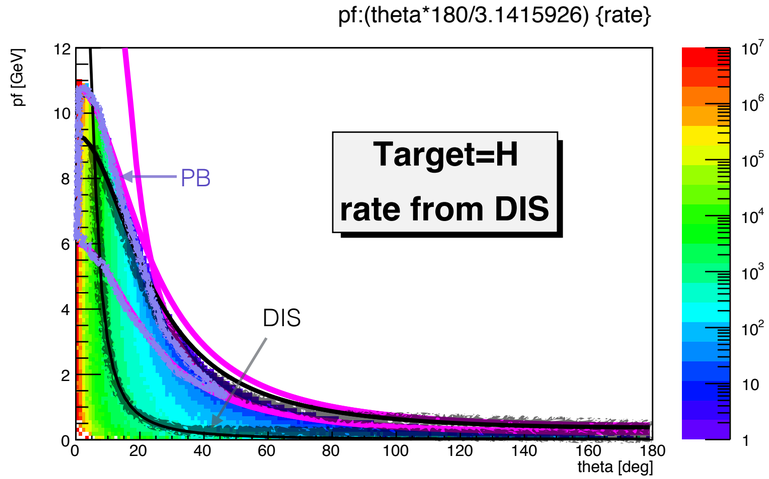


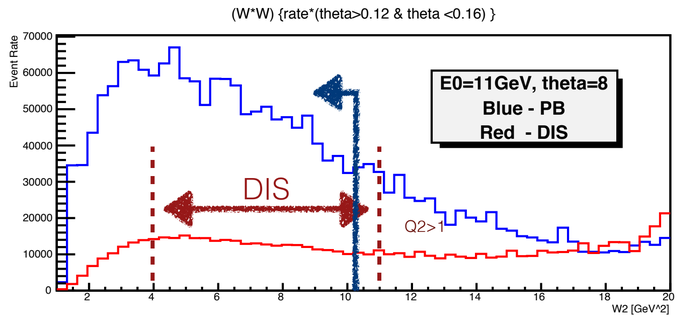


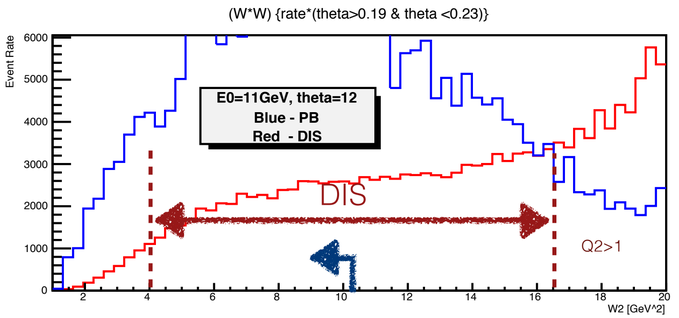


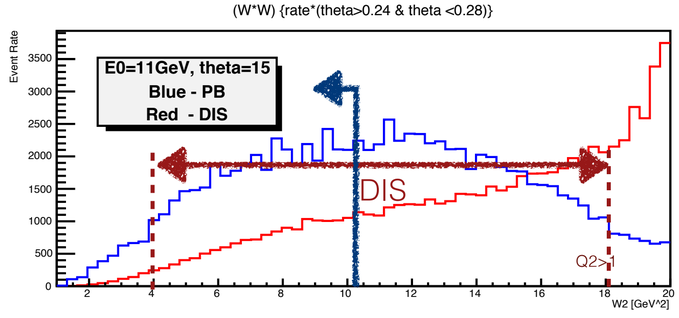
JPsi H target at E0=11GeV

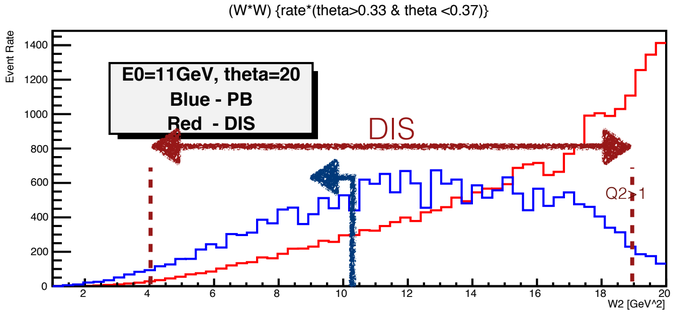


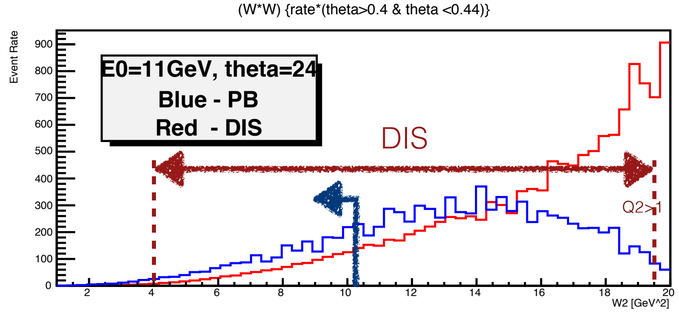


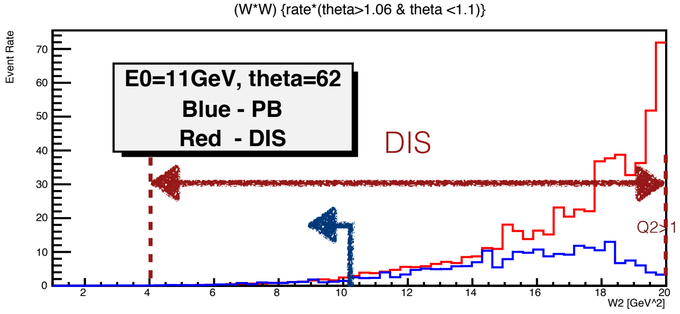






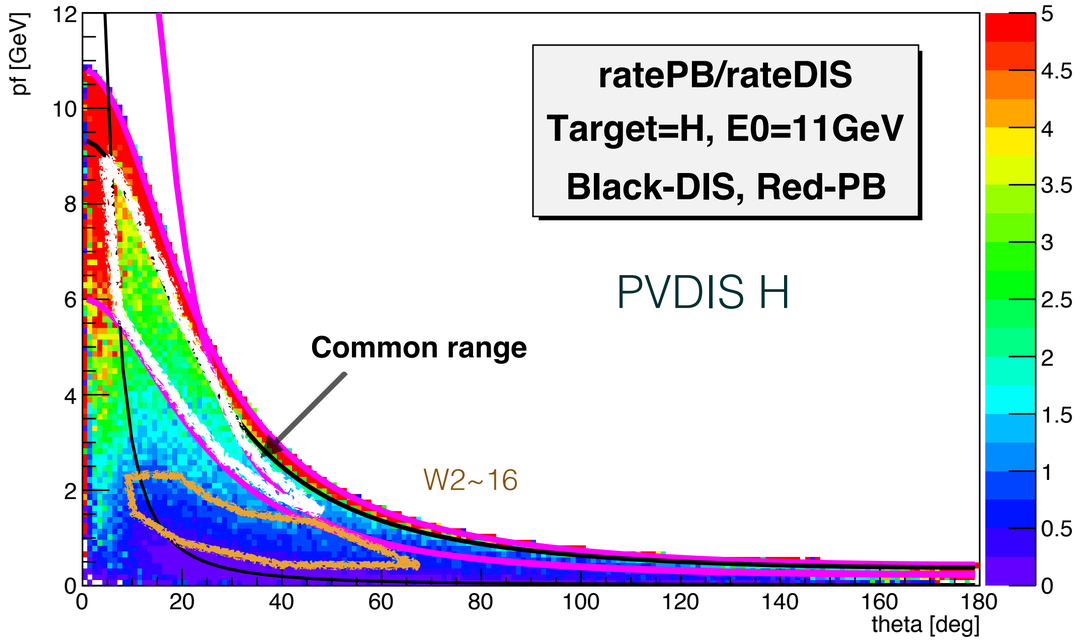


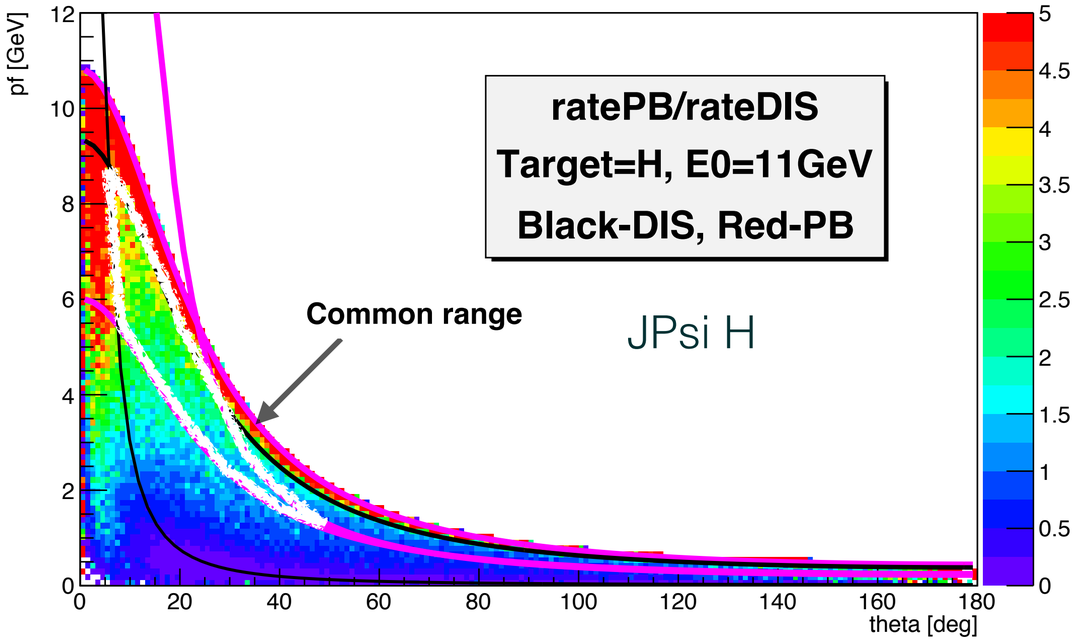


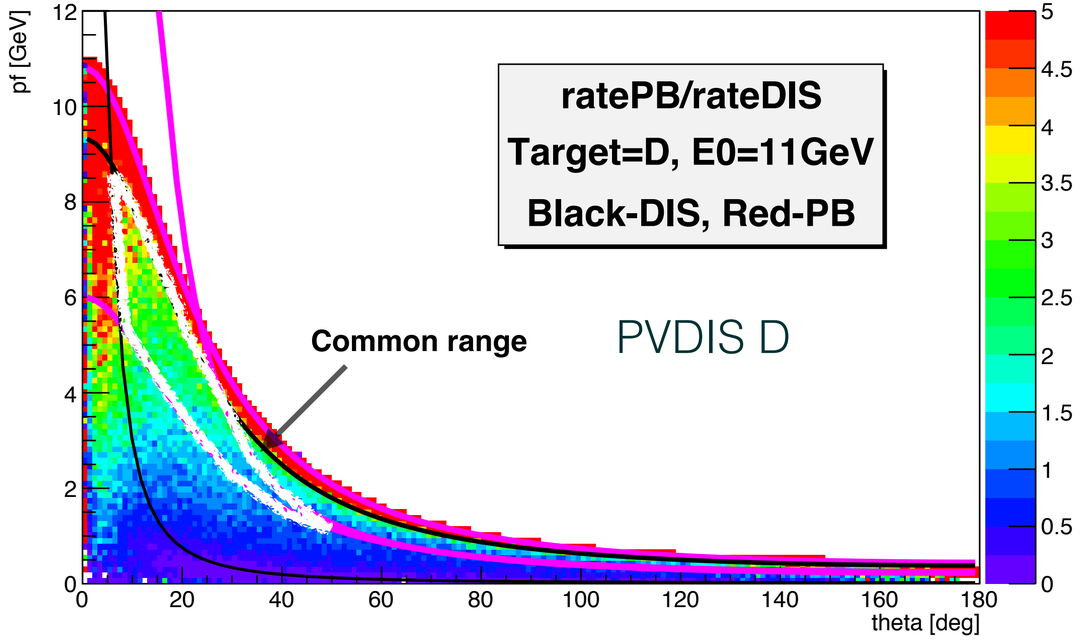


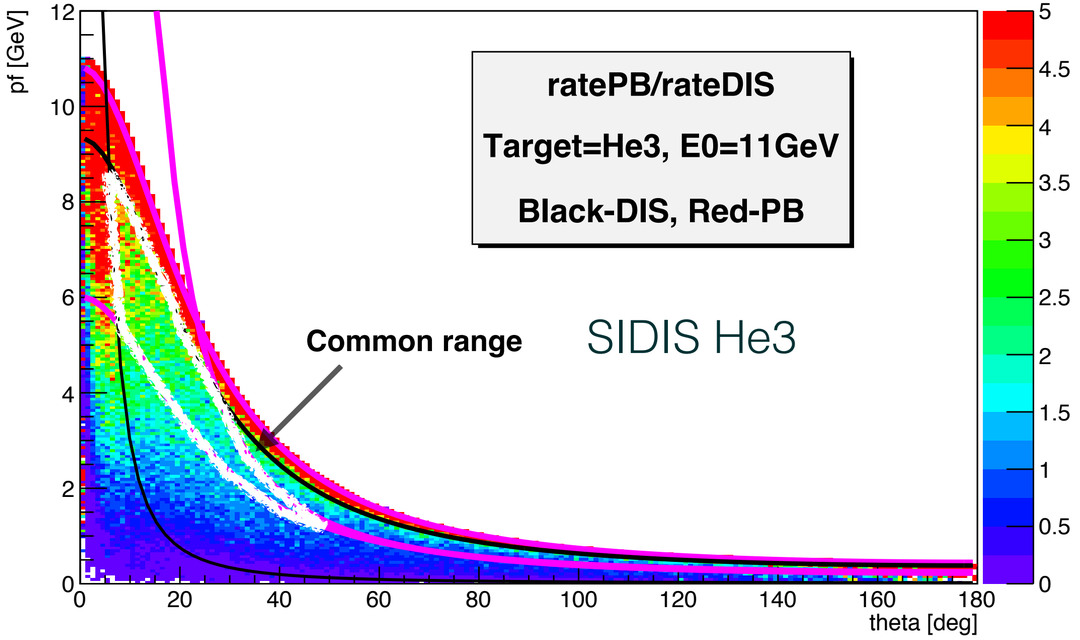
Distribution of Ratio

$$\frac{Rate_{PB}}{Rate_{DIS}}$$


ratePB/rateDIS
Target=H, E0=11GeV
Black-DIS, Red-PB
PVDIS H
Common range
W2~16
pf [GeV]
theta [deg]


ratePB/rateDIS
Target=H, E0=11GeV
Black-DIS, Red-PB
Common range
JPsi H
pf [GeV]
theta [deg]


ratePB/rateDIS
Target=D, E0=11GeV
Black-DIS, Red-PB
Common range
PVDIS D
pf [GeV]
theta [deg]


ratePB/rateDIS
Target=He3, E0=11GeV
Black-DIS, Red-PB
Common range
SIDIS He3
pf [GeV]
theta [deg]

The two models give different results,
ratio in common range is about

0.5~4

Potential problems with current model

- Coding errors when using cteq6 library
- Physics reasons when current model uses PDF fittings
- Both are right, but different functioning ranges. (less likely)
- Unrealized problems with PB
- Which one is right? which one should I use? (PB)

Summary

- successful software transplantation, producing simulations that agree with data of different nucleus.
- Notable difference exits. 0.5~4 ratio in common range; 0~2.5 in other DIS range; 1 around W2~16;
- Ratio distributions have minor difference between nucleus, but share the same pattern.
- Further research: what causes the difference? which one is more reliable?