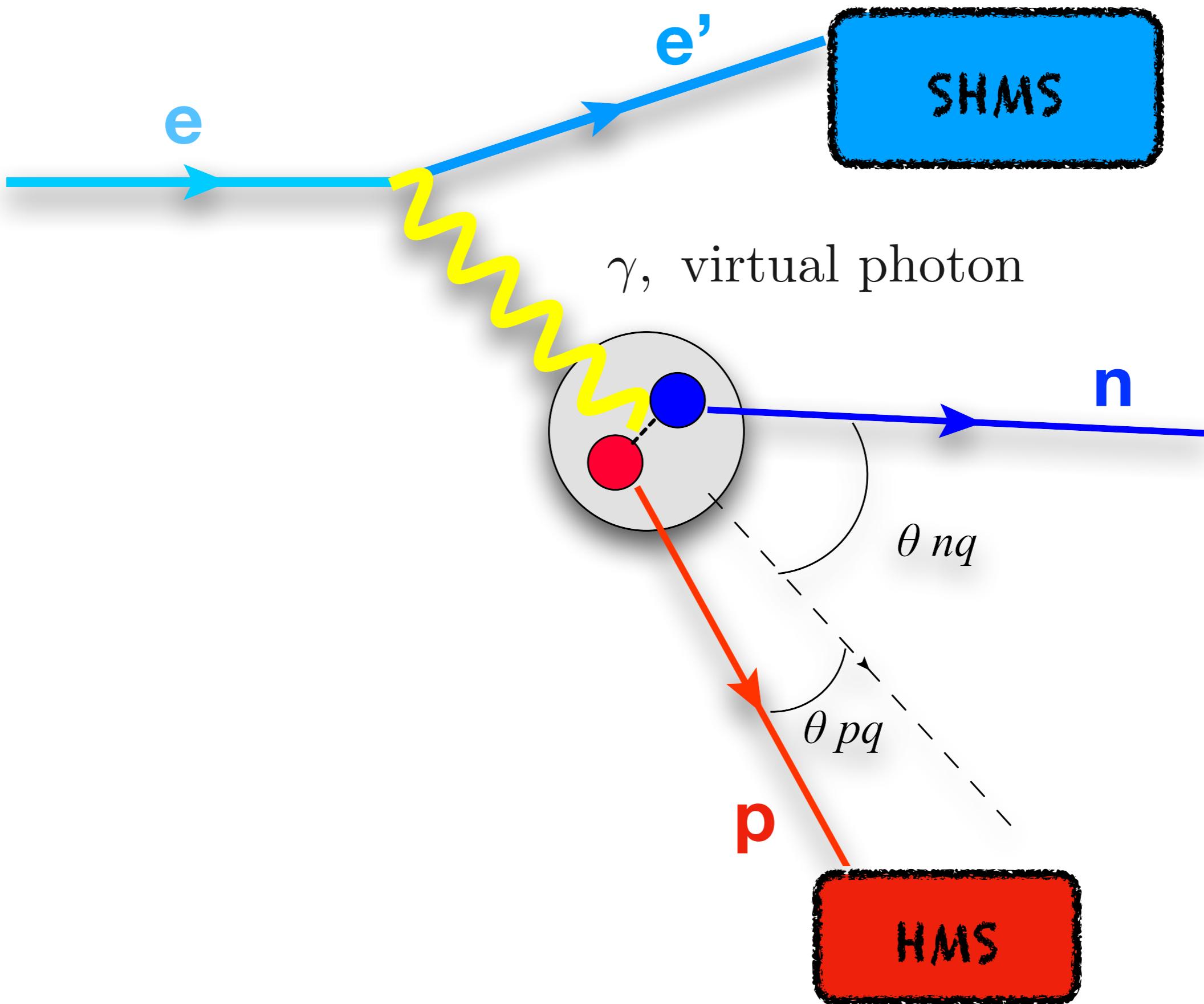




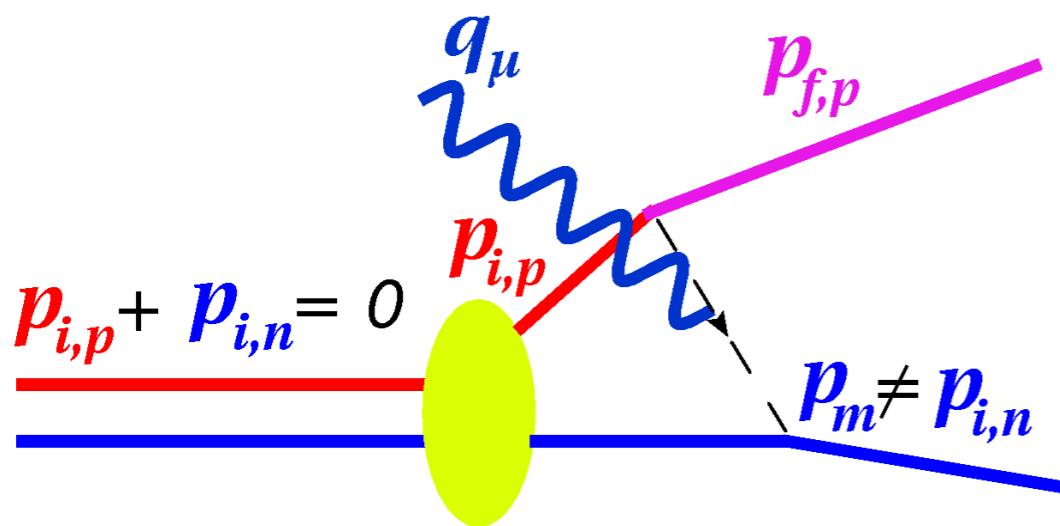
Deuteron Electro-Disintegration Experiment (E12-10-003)

Carlos Yero
May 11, 2018

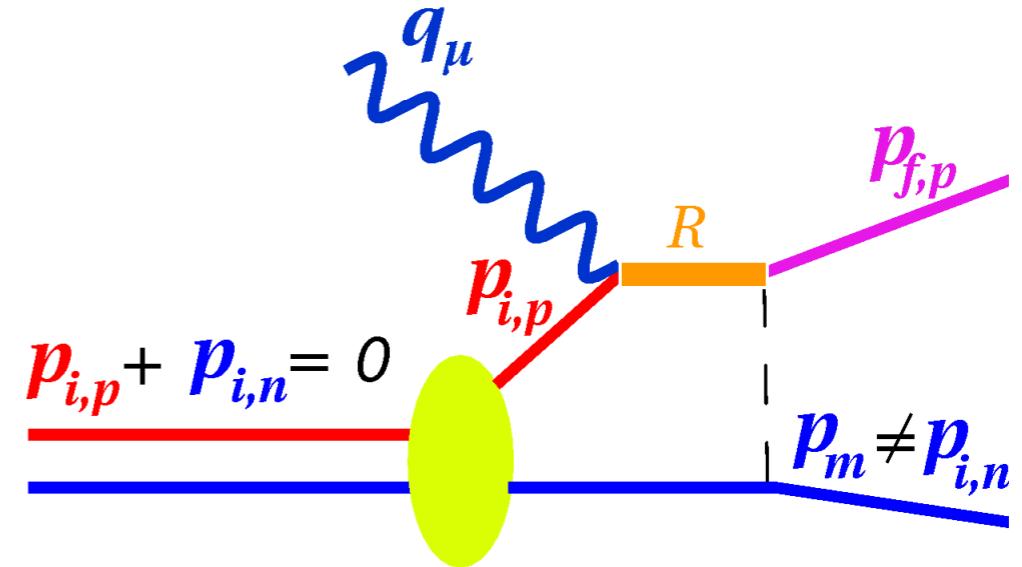
D($e, e' p$)n Reaction Kinematics



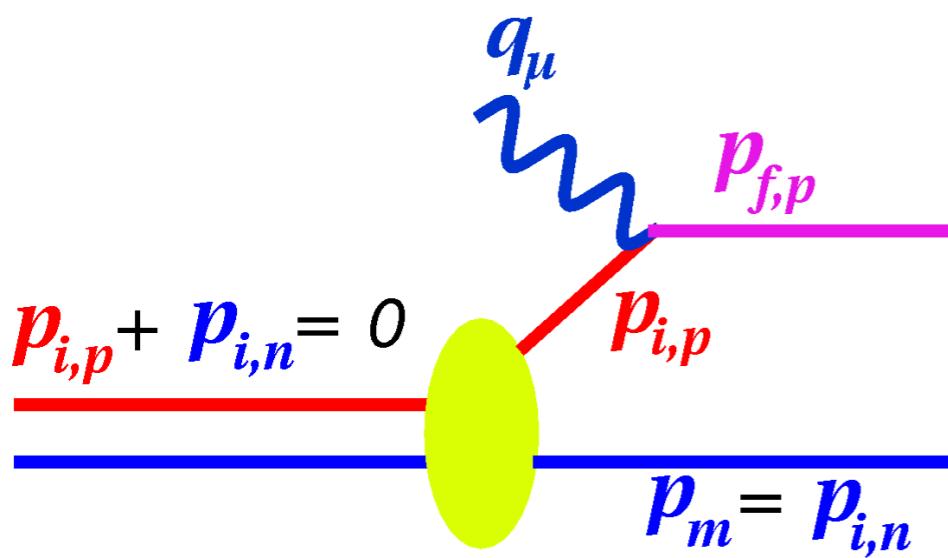
D(e,e'p)n Interactions



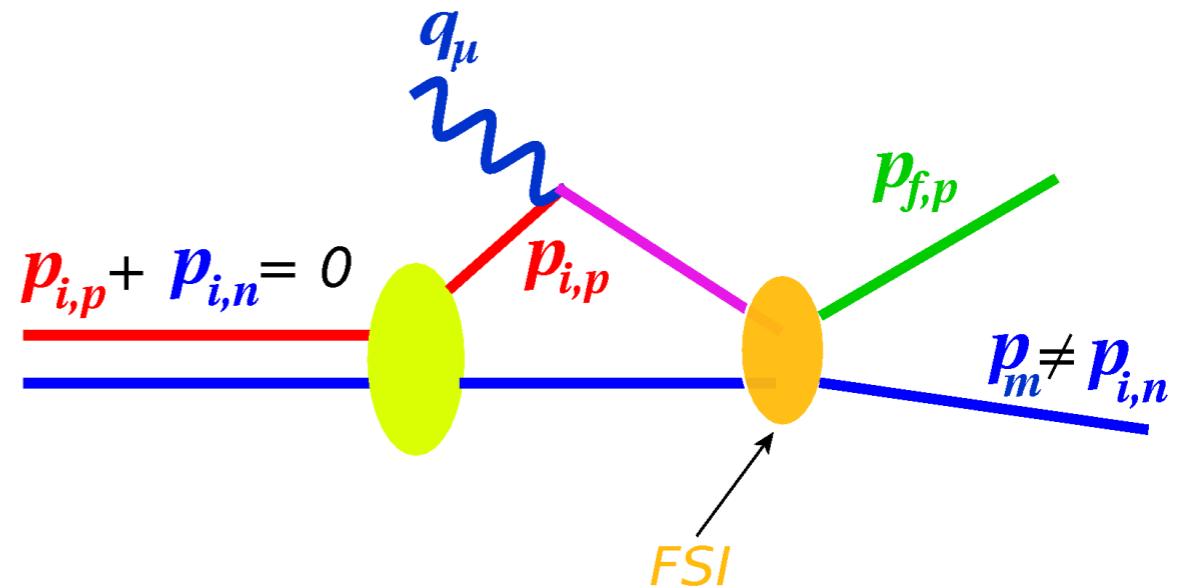
Meson-Exchange Currents (MEC)



Isobar Configurations (IC)



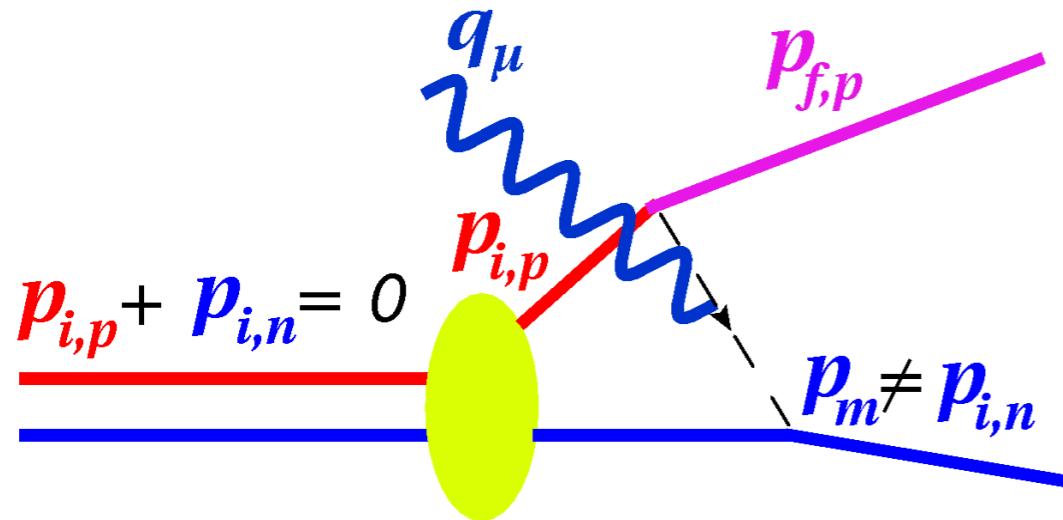
Plane Wave Impulse Approximation (PWIA)



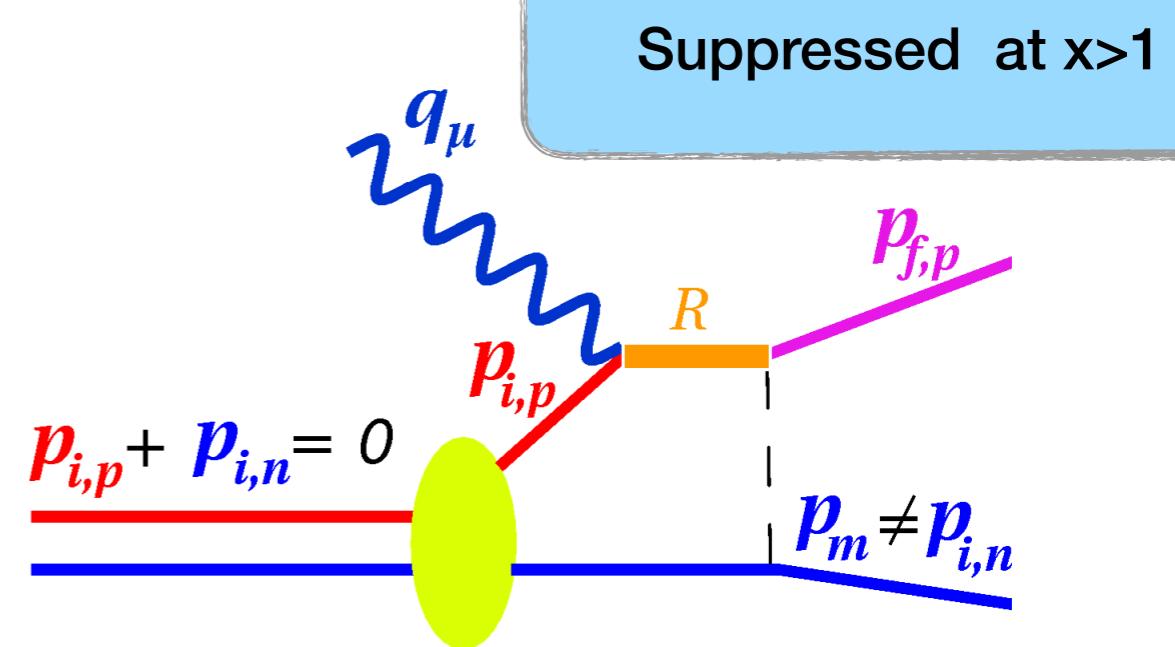
Final State Interactions (FSI)

D(e,e'p)n Interactions

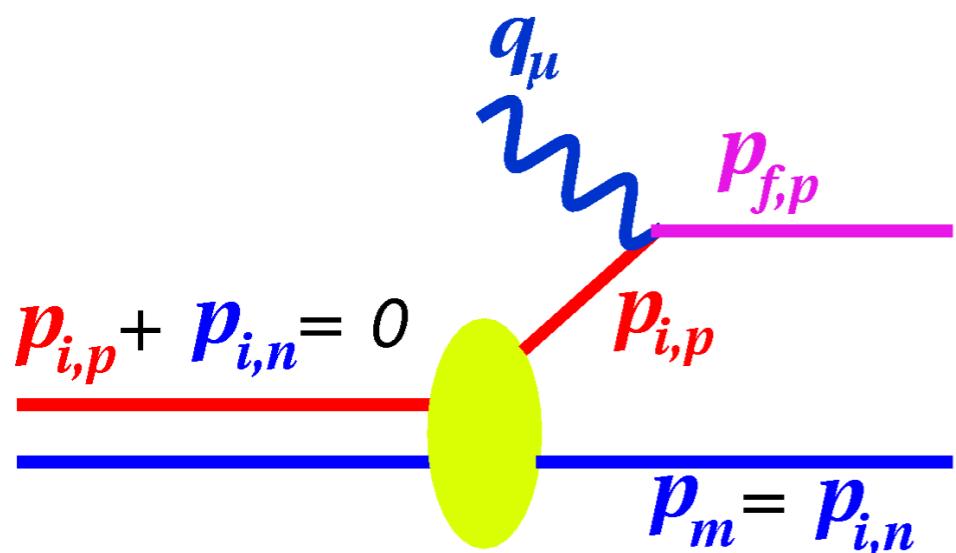
Suppressed at $Q^2 > 1$



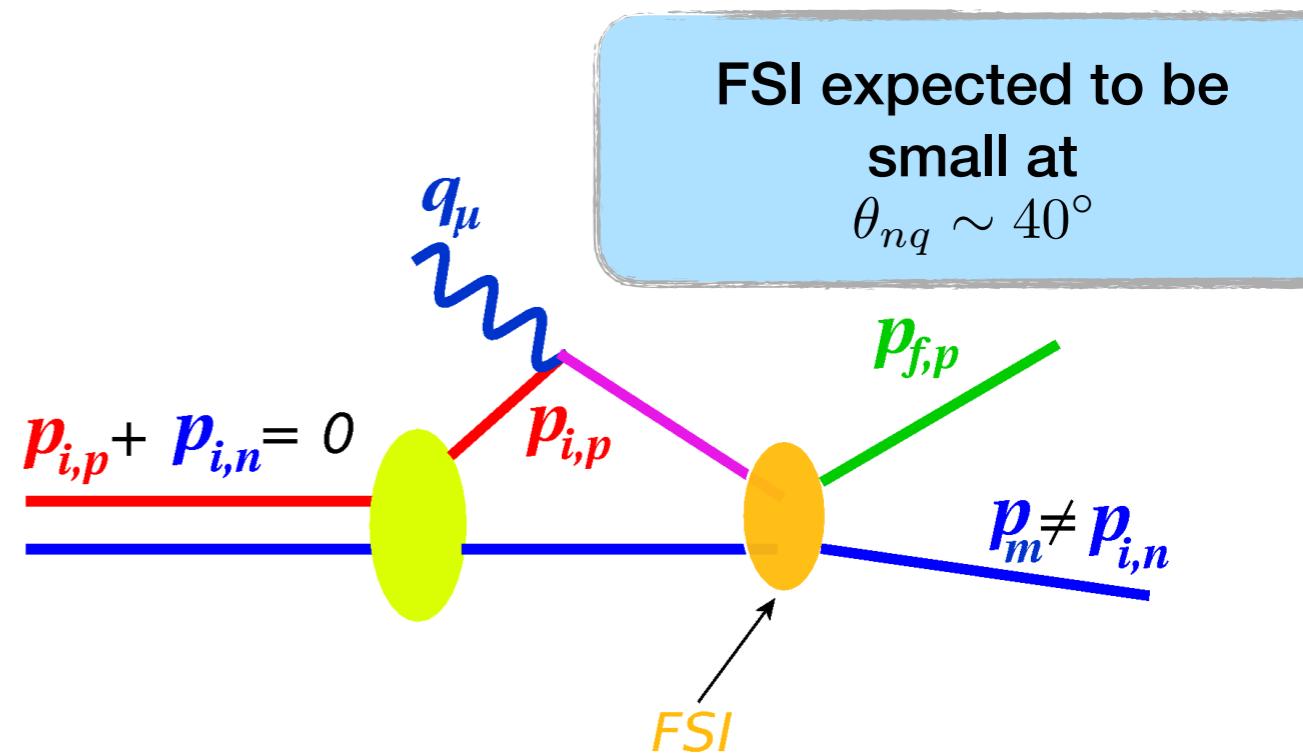
Meson-Exchange Currents (MEC)



Isobar Configurations (IC)

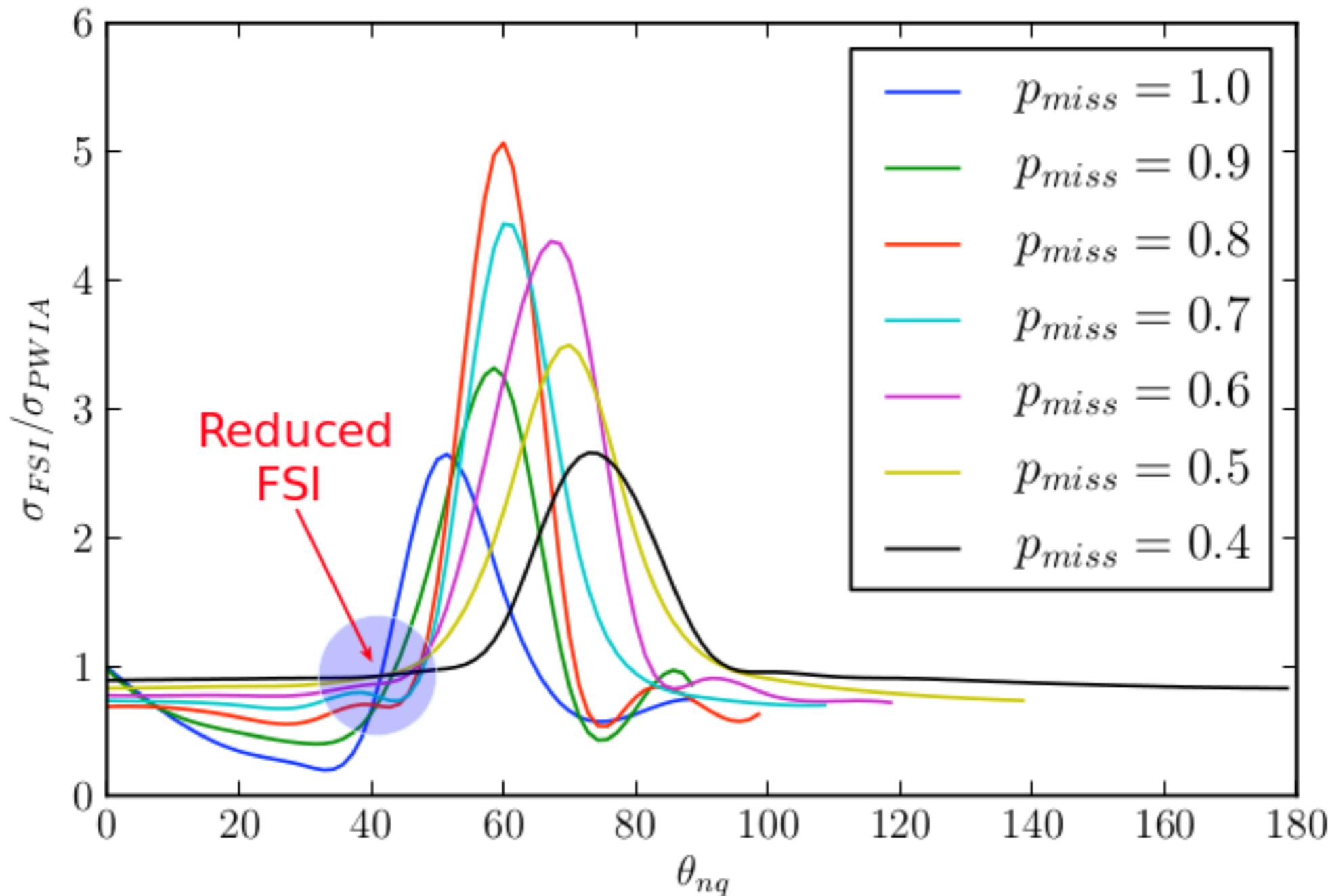


Plane Wave Impulse Approximation (PWIA)



Final State Interactions (FSI)

D(e,e'p)n (E12-10-003) Theoretical Background



Theoretical Calculation by:
Dr. Misak Sargsian

E12-10-003

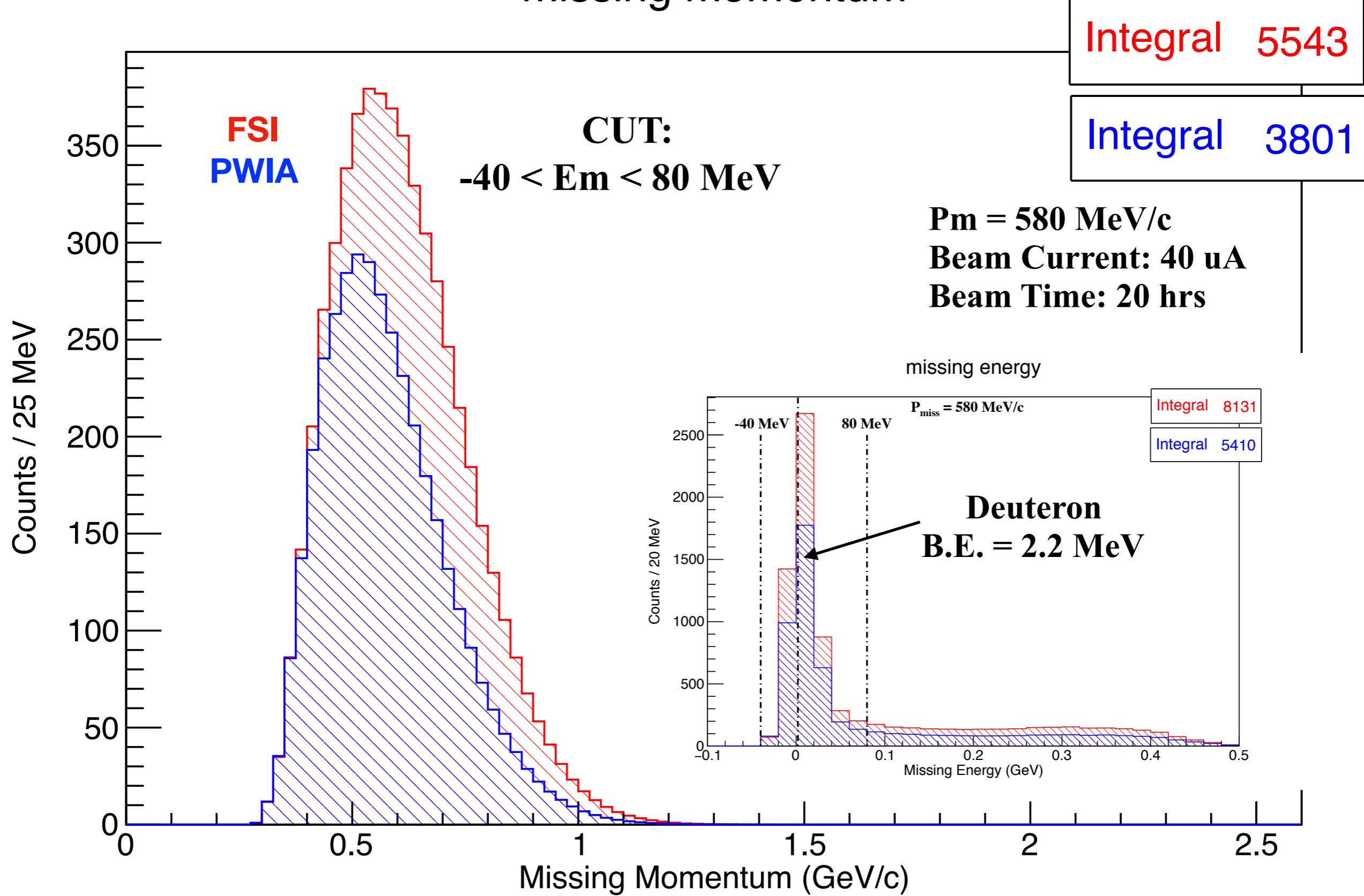
Simulation Results

for
Missing Momentum Setting: 580 MeV/c

**For detailed simulation results of this and other settings measured,
See BackUp Slides**

E12-10-003: Simulation Results

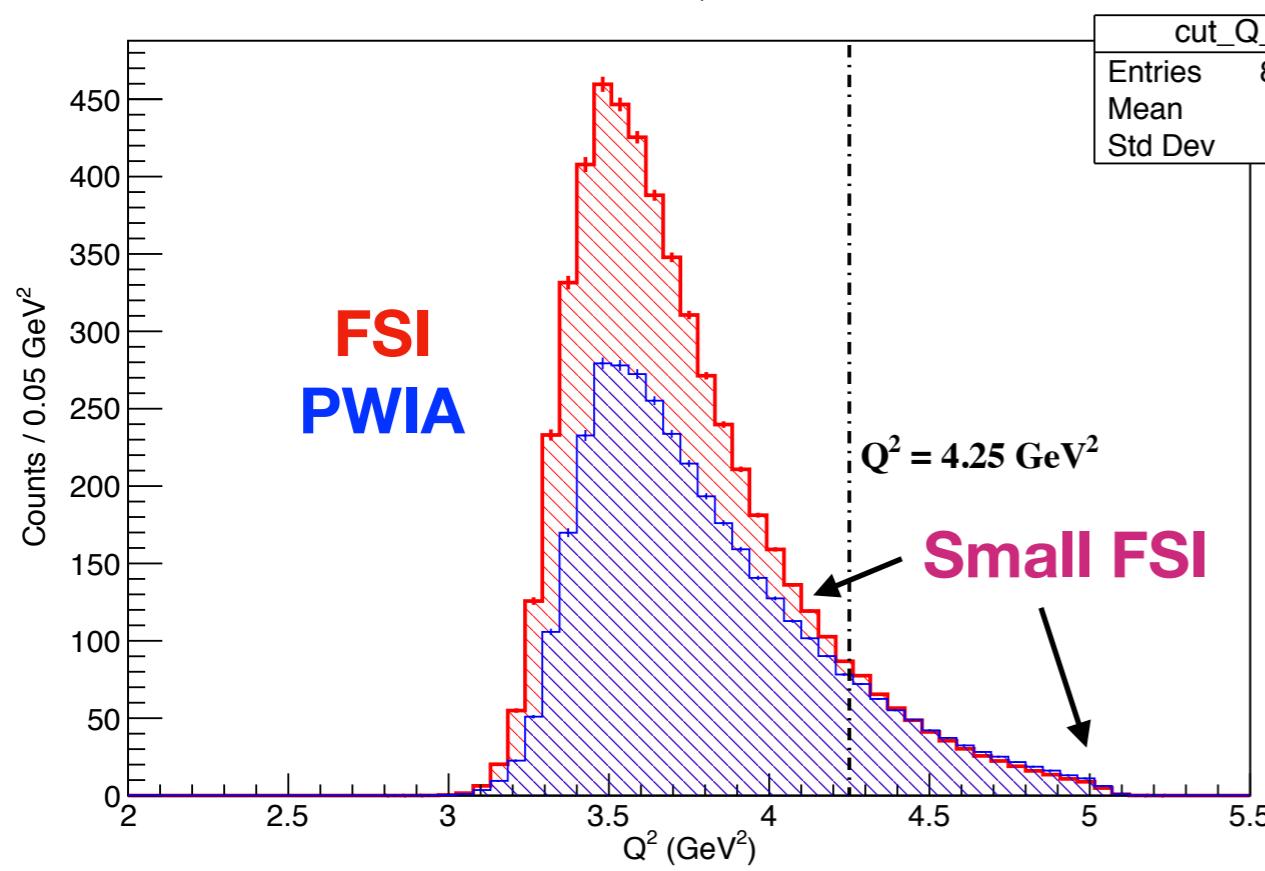
missing momentum



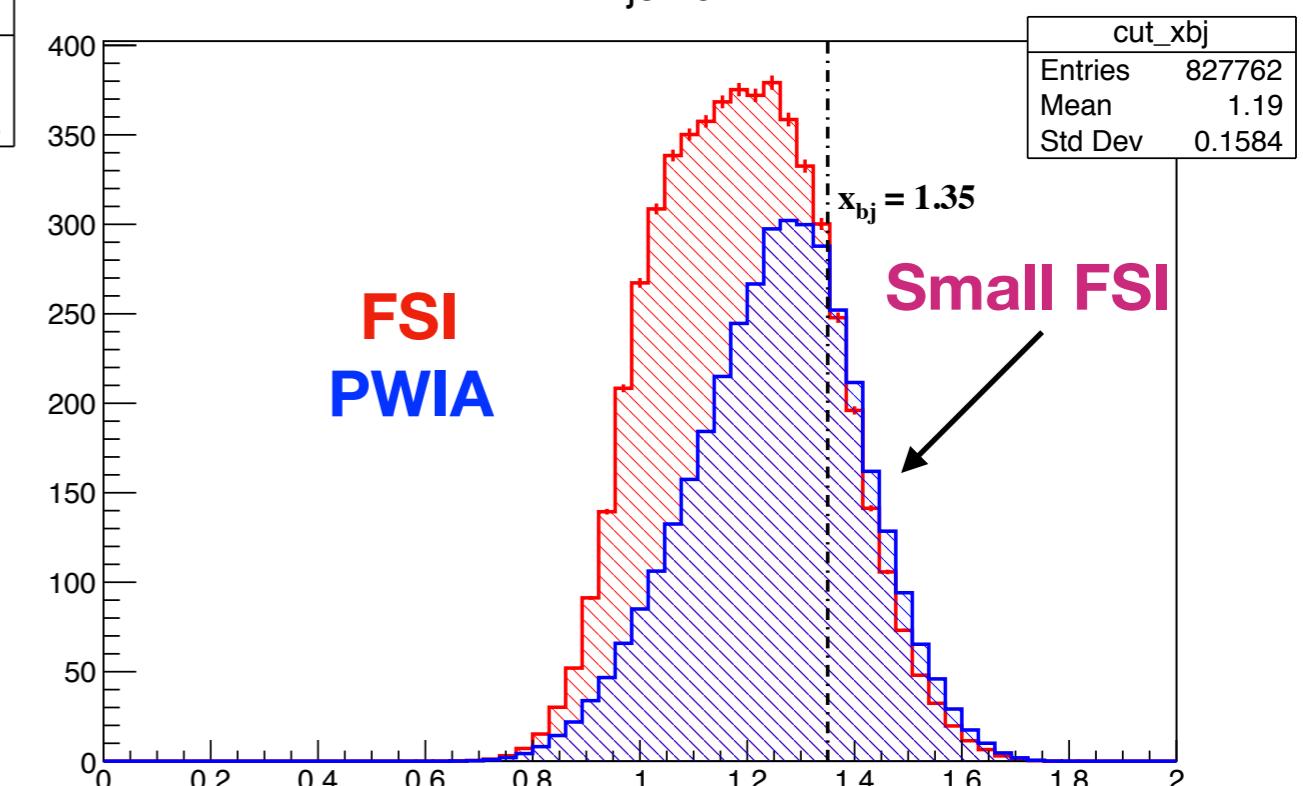
Missing Momentum = 580 MeV/c

CUT: $-40 < E_m < 80$ MeV

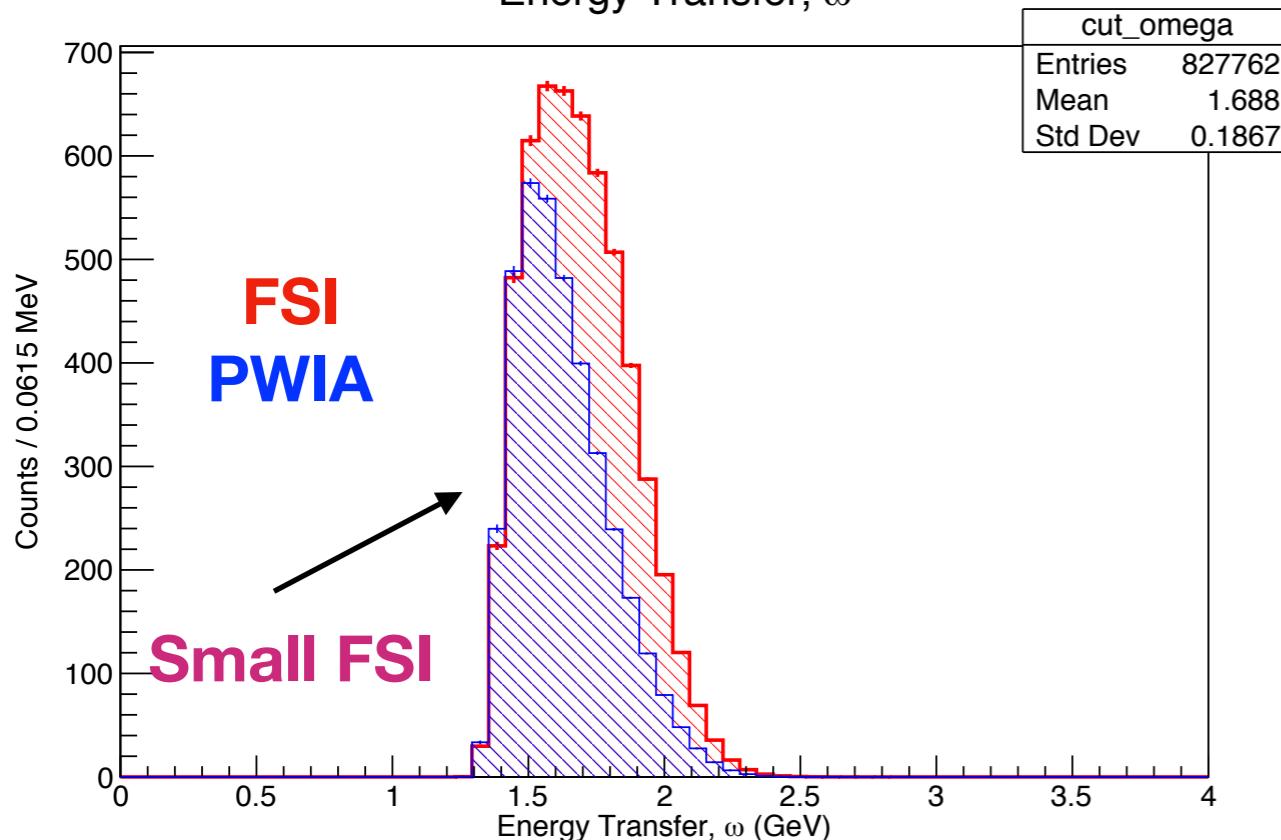
Q2



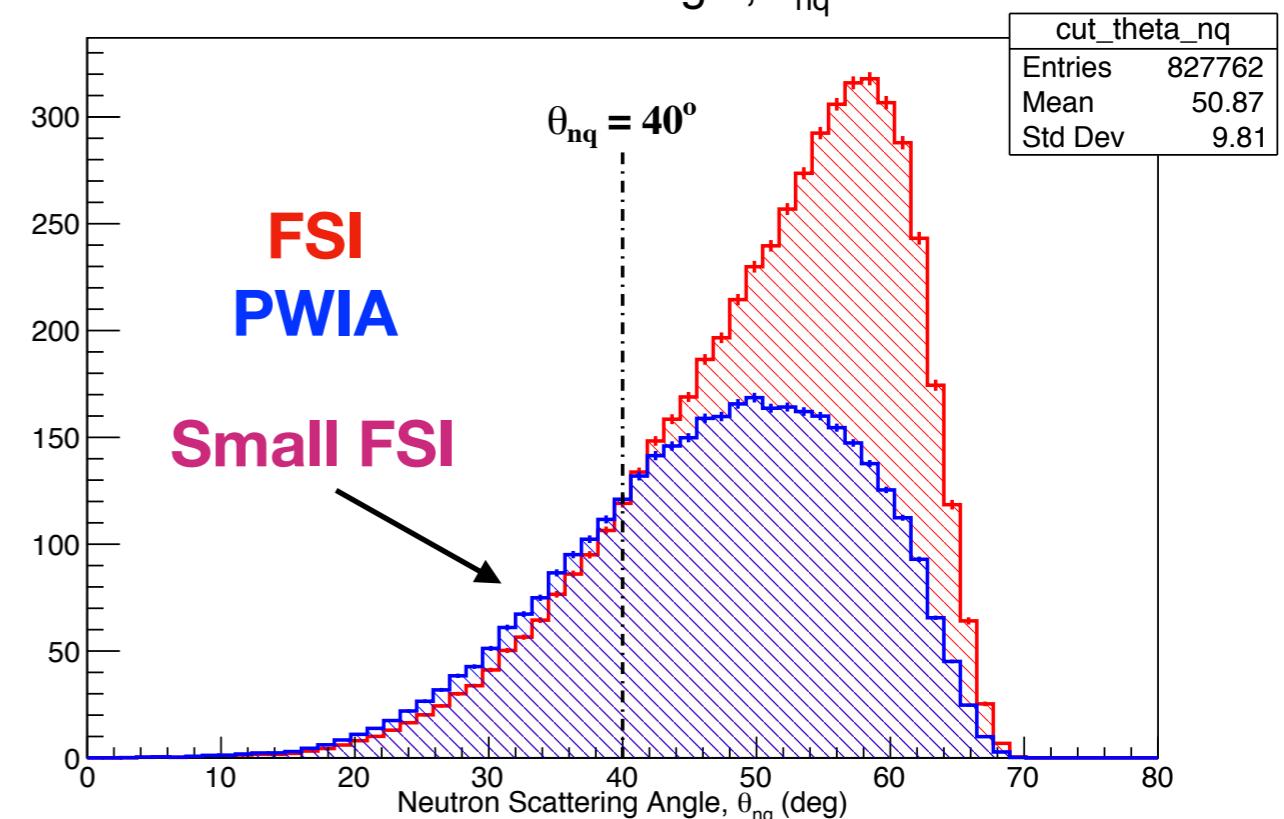
x-Bjorken



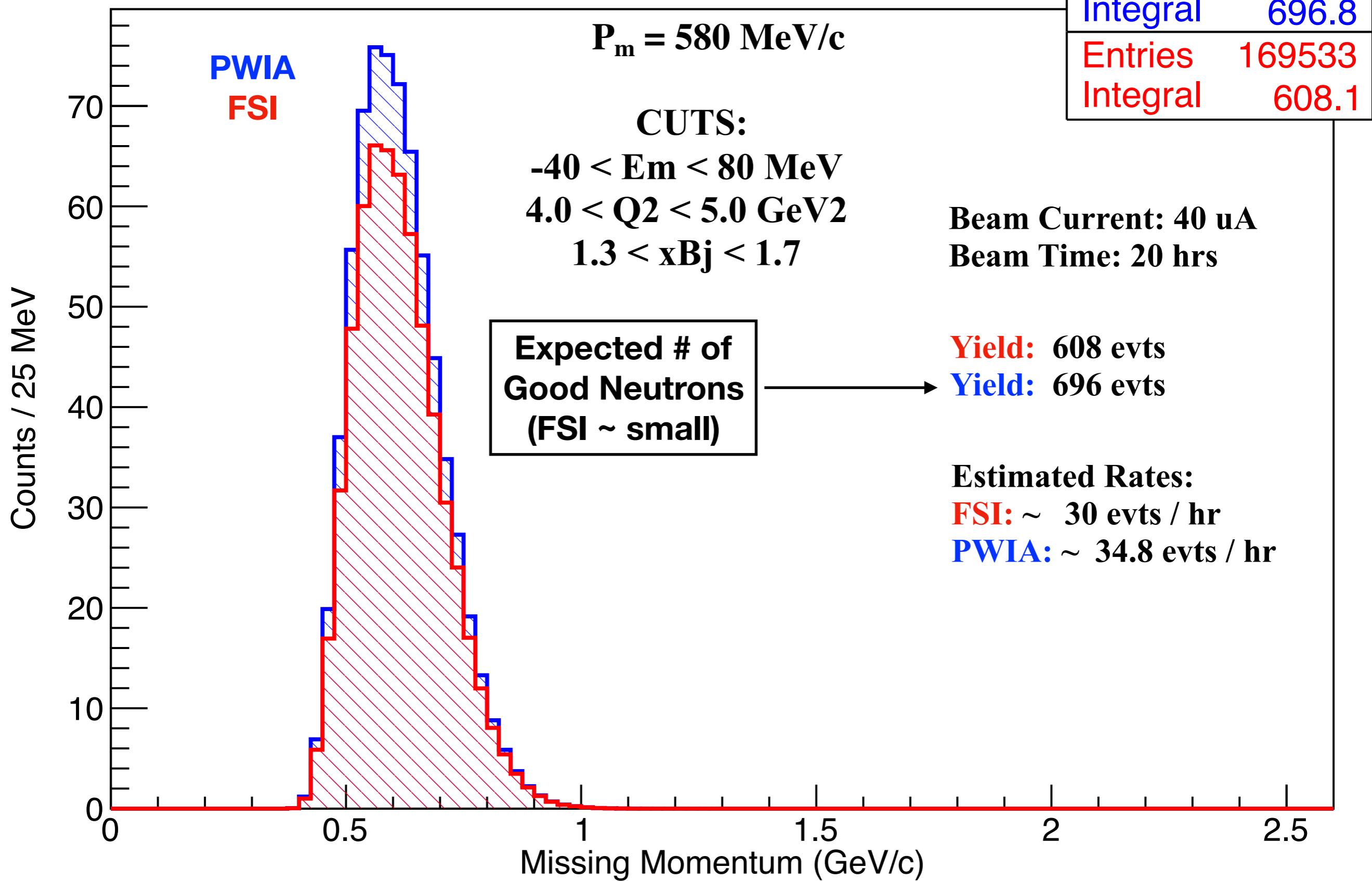
Energy Transfer, ω



Neutron Angle, θ_{nq}



missing momentum



E12-10-003:

First Look at

Experimental Results

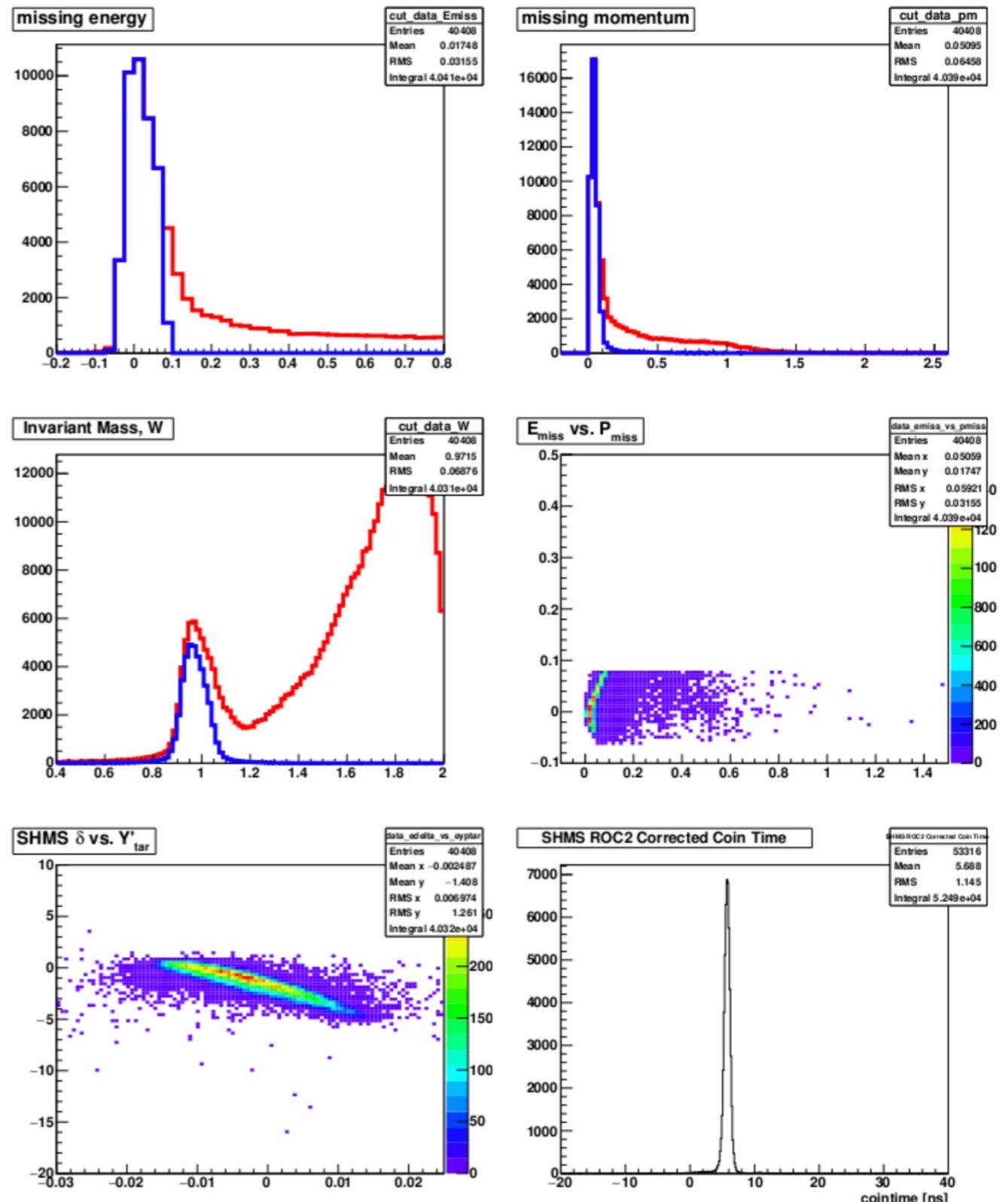
**For detailed first data results of this and other settings measured,
See BackUp Slides**

Overview of the Experiment Data-Taking Stage

Run Period: April 3 to April 10, 2018

Data was monitored online for quality check.

Example of Online Monitoring plots
For a $H(e,e'p)$ run.



Overview of the Experiment Data-Taking Stage

Run Period: April 3 to April 10, 2018

Data was monitored online for quality check.

A standard kinematics file was constantly kept up to date, with the spectrometer settings, Beam and target information, before data replay.

Snippet of standard kinematics datafile



```
#D2 Electro-Disintegration (E12-10-003) - April 4, 2018
```

```
#Al Dummy Run (for H(e,e'p))
```

```
3252-3258
```

```
gpbeam = 10.600
```

```
gtargmass_amu = 26.98
```

```
htheta_lab = -37.2900
```

```
ptheta_lab = 12.200
```

```
hcentral = 2.93814
```

```
ppcentral = 8.700*0.985
```

```
ppartmass = 0.0005109
```

```
hpartmass = 0.93827231
```

```
#Proton Absorption Measurements
```

```
3259-3263
```

```
gpbeam = 10.600
```

```
gtargmass_amu = 1.00794
```

```
htheta_lab = -37.2900
```

```
ptheta_lab = 12.200
```

```
hcentral = 2.93814
```

```
ppcentral = 8.700*0.985
```

```
ppartmass = 0.0005109
```

```
hpartmass = 0.93827231
```

```
#D2 - Low Missing Momentum Setting = 80 MeV
```

```
3264-3268
```

```
gpbeam = 10.600
```

```
gtargmass_amu=2.014101
```

```
htheta_lab = -38.89
```

```
ptheta_lab = 12.200
```

```
hcentral = 2.844
```

```
ppcentral = 8.7*0.985
```

```
ppartmass = 0.0005109
```

```
hpartmass = 0.93827231
```

```
#D2 - High Missing Momentum Setting = 580 MeV
```

```
3269-3282
```

```
gpbeam = 10.600
```

```
gtargmass_amu=2.014101
```

```
htheta_lab = -54.96
```

```
ptheta_lab = 12.200
```

```
hcentral = 2.194
```

```
ppcentral = 8.700*0.985
```

```
ppartmass = 0.0005109
```

```
hpartmass = 0.93827231
```

```
# optics scan for SHMS Q3 and HB with optics #1 and sieve
```

```
3283-3287
```

```
gpbeam = 10.600
```

```
gtargmass_amu = 12.0107
```

```
htheta_lab = -54.96
```

```
ptheta_lab = 8.915
```

```
hcentral = 2.194
```

```
ppcentral = 8.700*0.985
```

```
ppartmass = 0.0005109
```

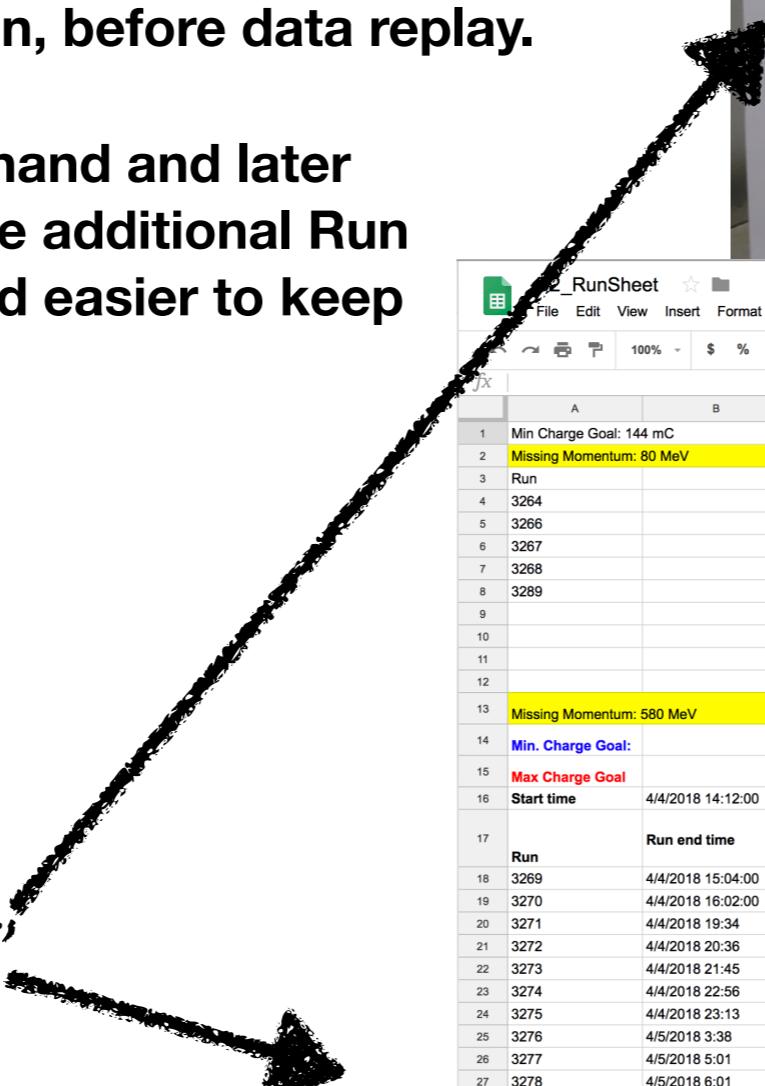
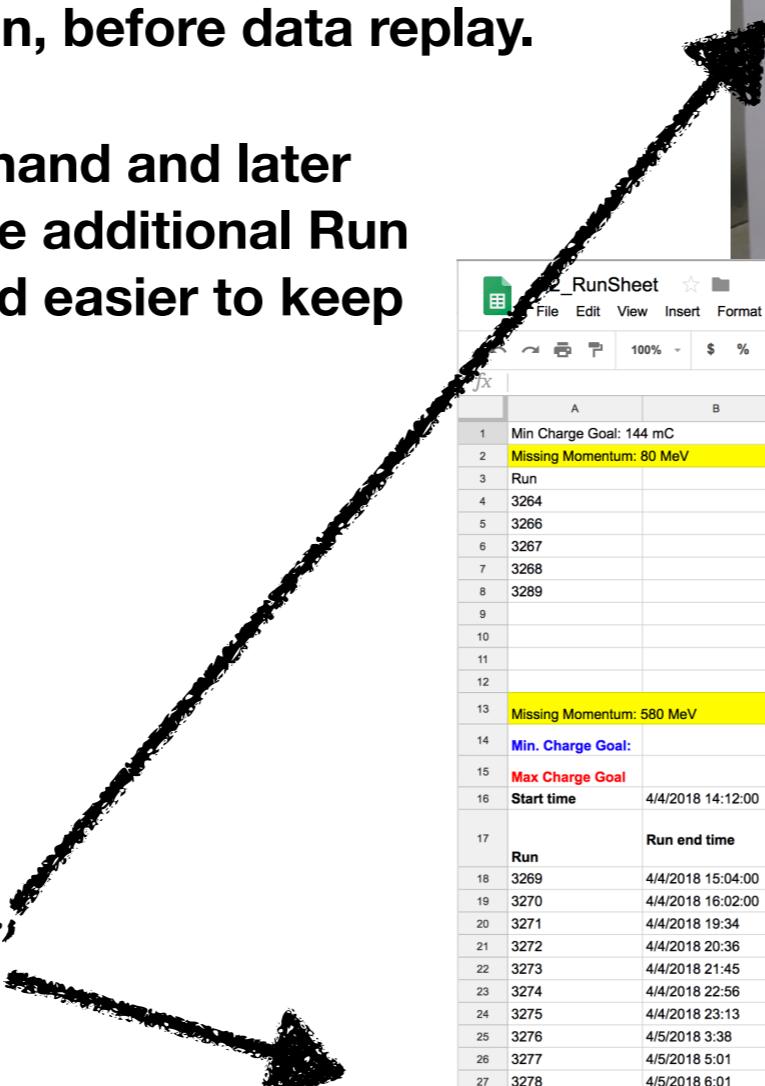
Overview of the Experiment Data-Taking Stage

Run Period: April 3 to April 10, 2018

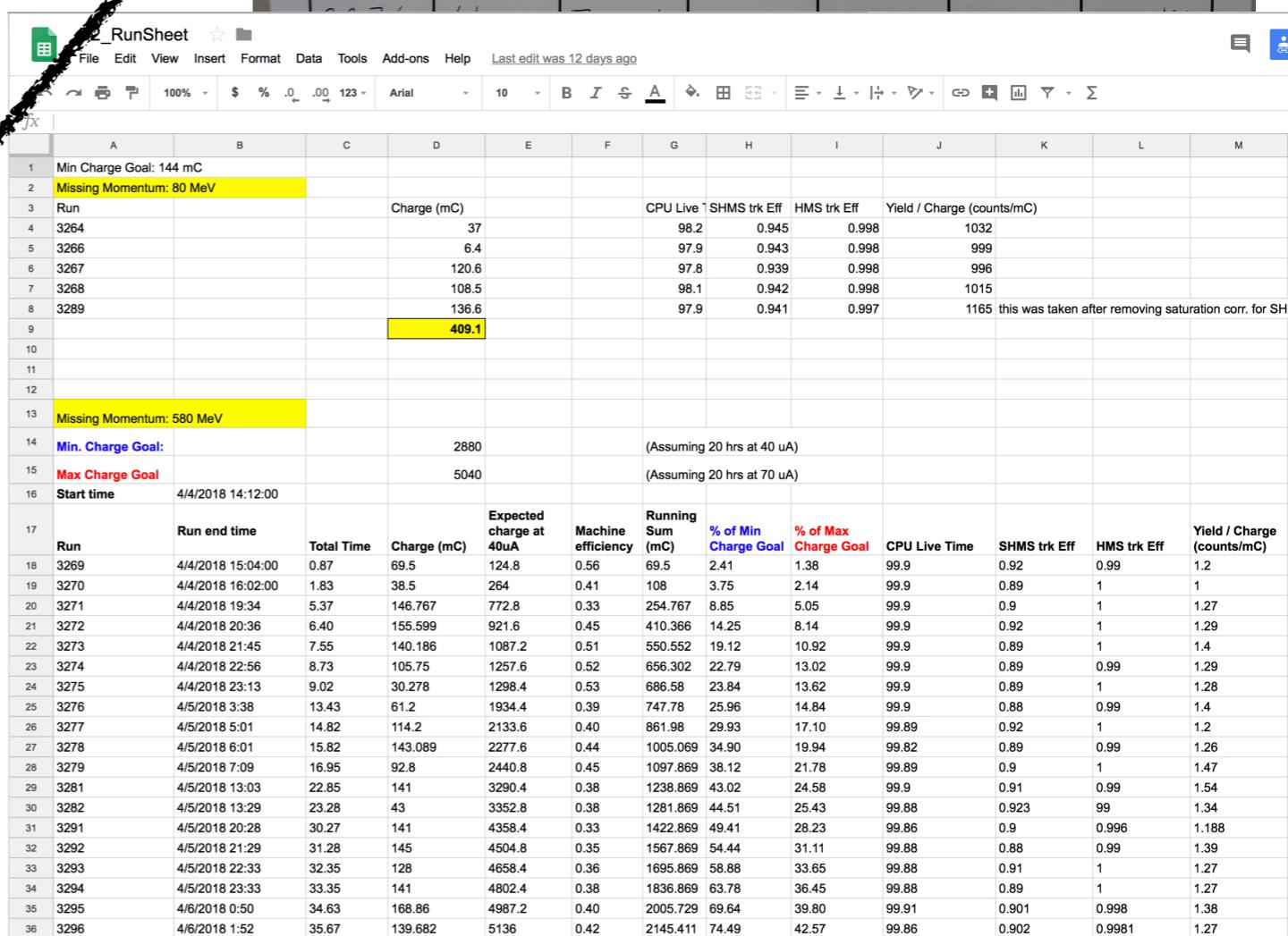
Data was monitored online for quality check.

A standard kinematics file was constantly kept up to date, with the spectrometer settings, Beam and target information, before data replay.

Runs were recorded by hand and later to GoogleDocs, where more additional Run information was added, and easier to keep track of.



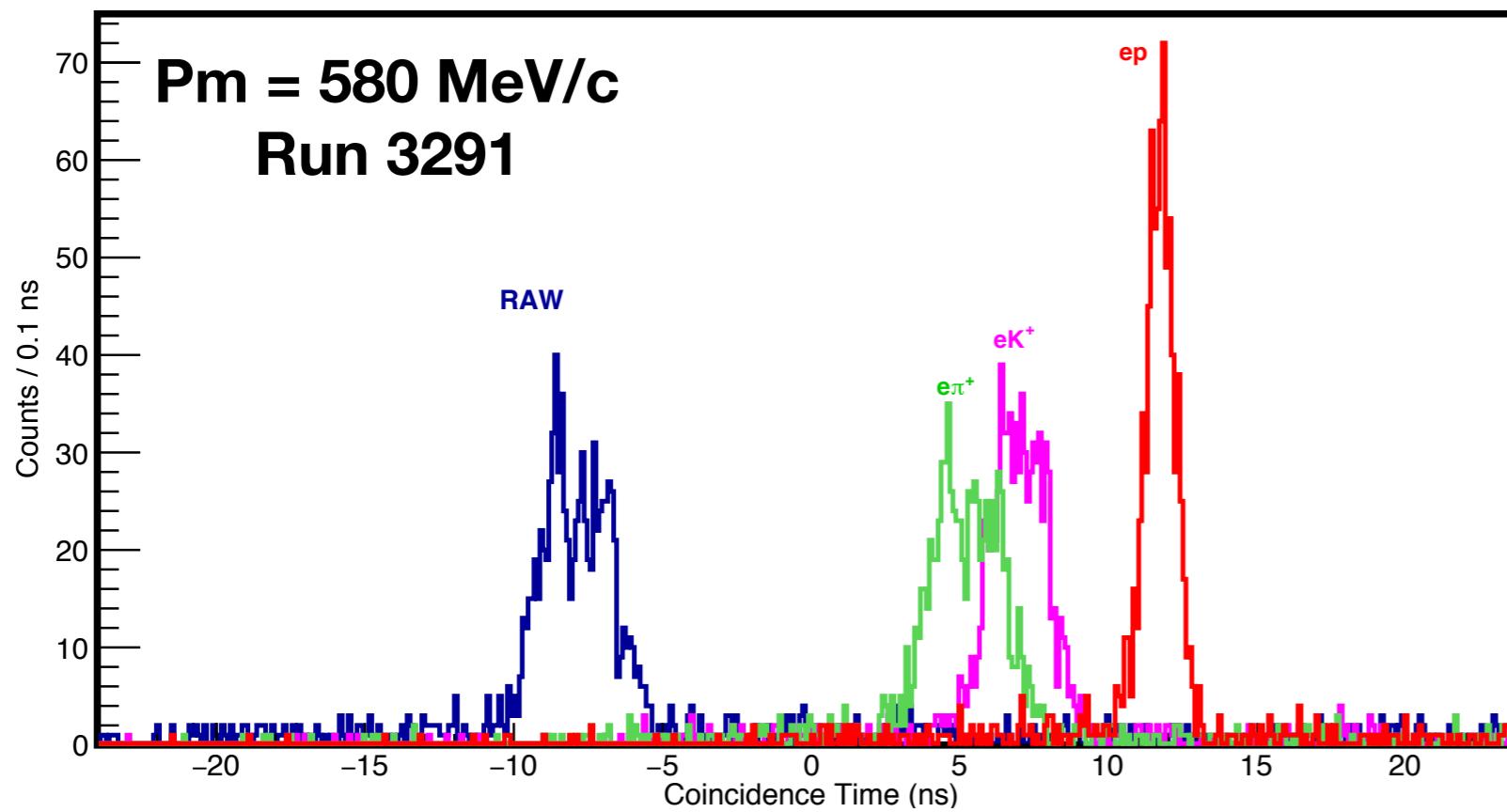
Run#	BCM4A(m)	Running BCM4B Total(m)	Computer Live Time	SHMS trkEff	HMS trkEff	Yield/ Charge
3269	69.5	69.5	99.9	.92	.99	1.2/mC
3270	38.5	108.0	99.9	.89	1.0	1.0/mC
3271	146.767	254.7	99.9	0.9	1.0	1.27/mC
3272	155.599	410.2	99.9	0.92	1.0	1.29/mC
3273	140.186	550.3	99.9	0.89	1.0	1.4/mC
3274	105.75	656.0	99.9	0.89	0.99	1.29/mC
3275	30.278	686.2	99.9	0.89	1.0	1.28/mC



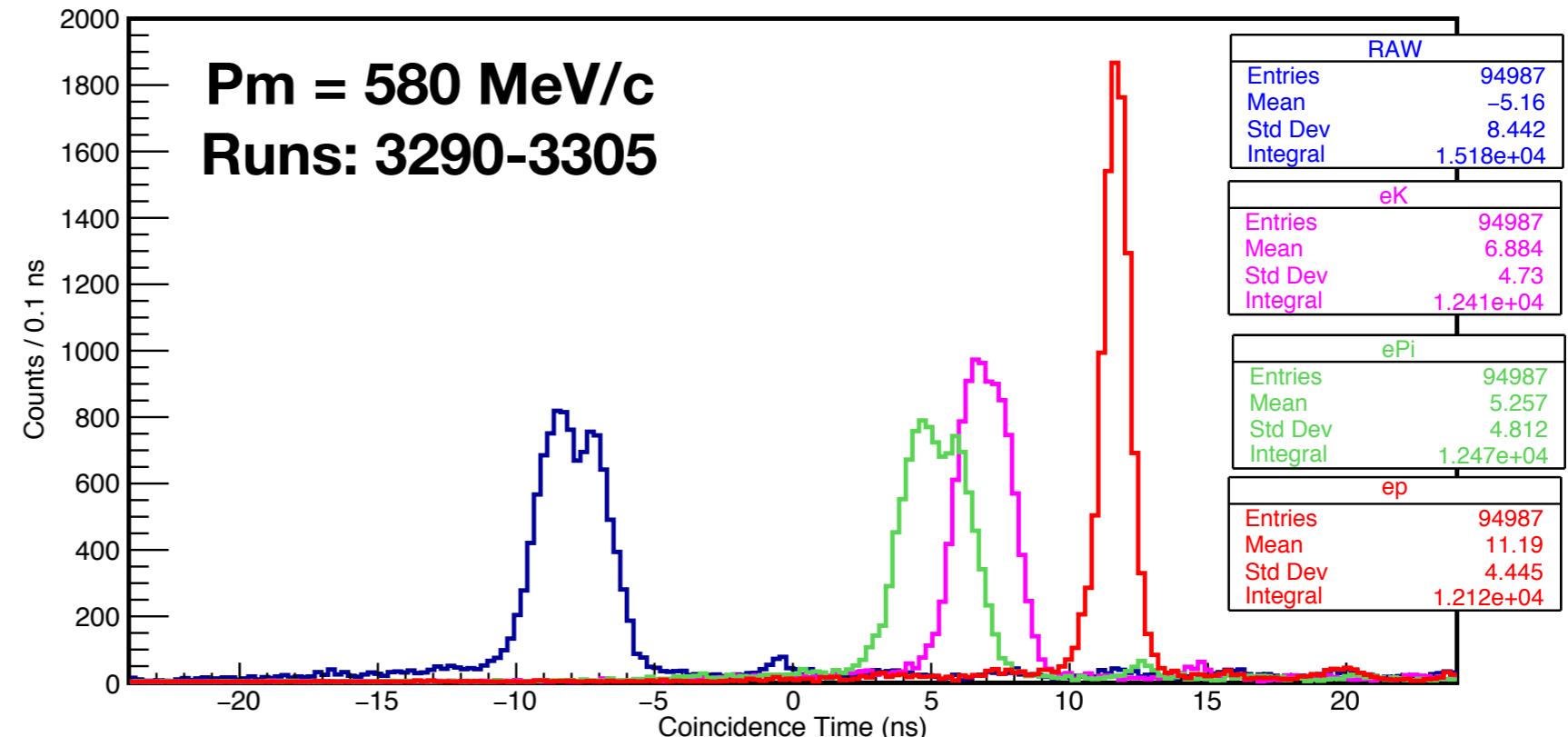
Runs Recorded by hand,
and then written to
GoogleDocs

A First Look at Coincidence Times

CTime.CoinTime_RAW_ROC2



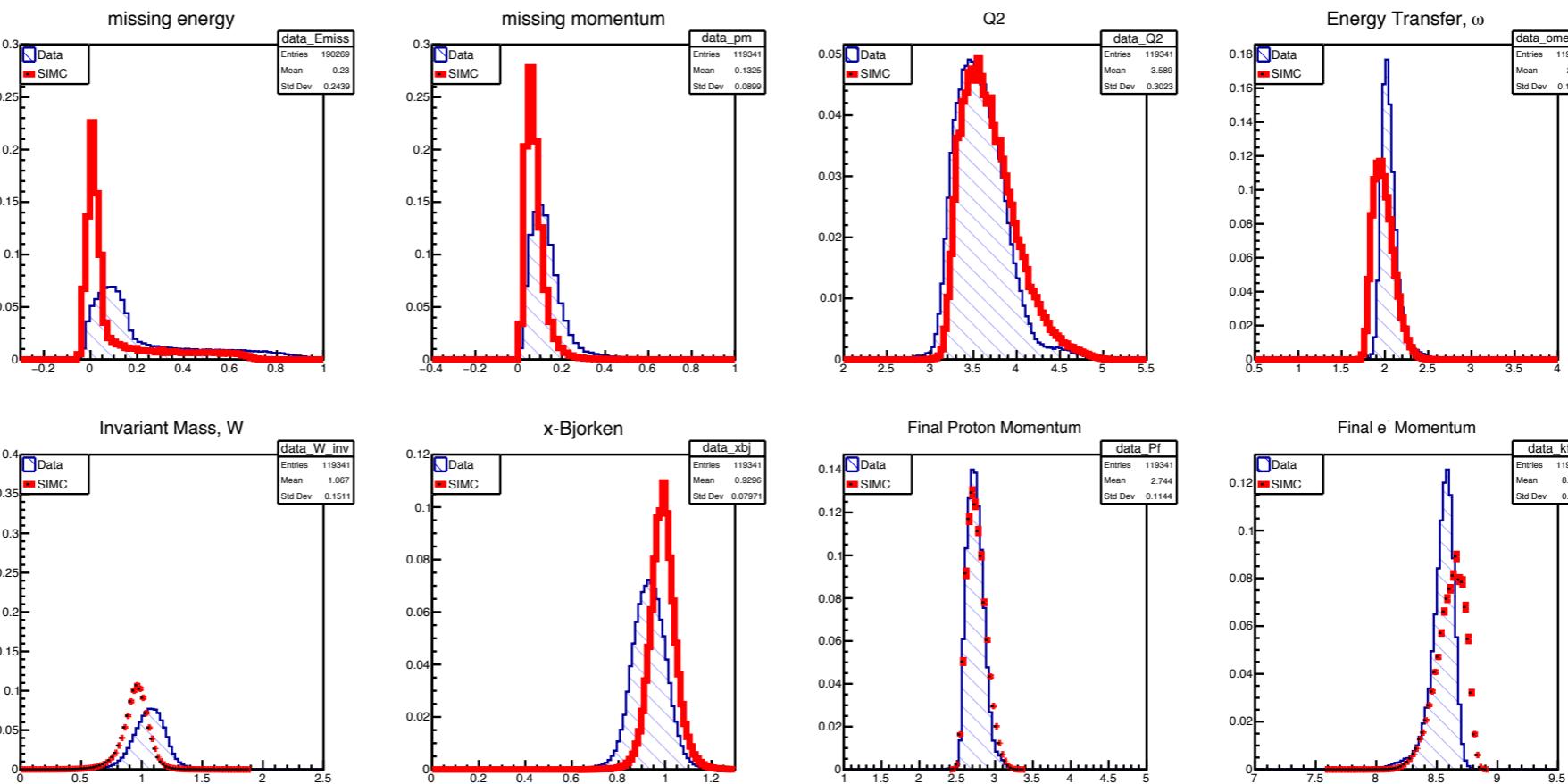
CTime.CoinTime_RAW_ROC2



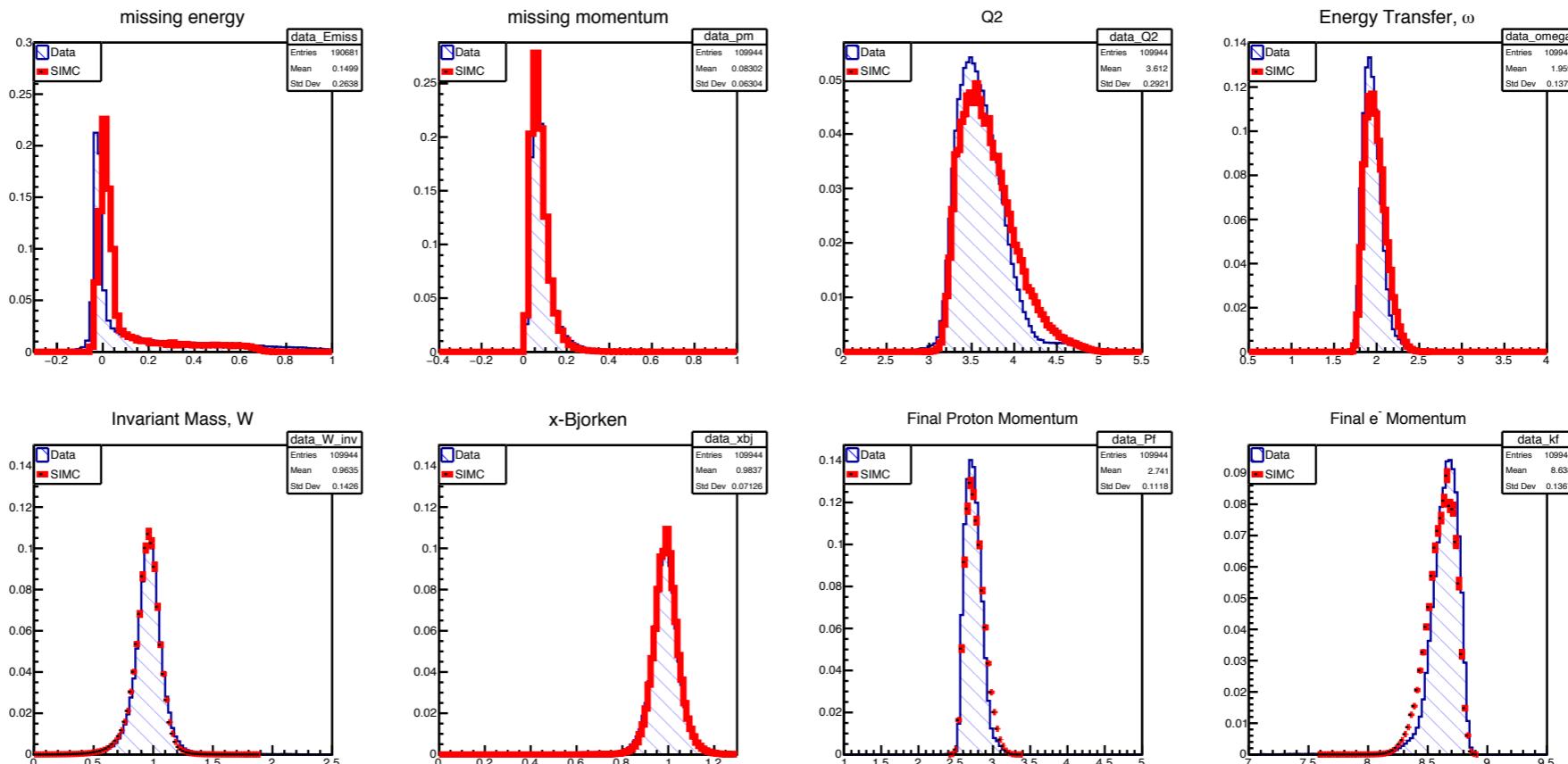
Kinematic Setting: 80 MeV Missing Momentum

Comparison between old/new SHMS delta matrix

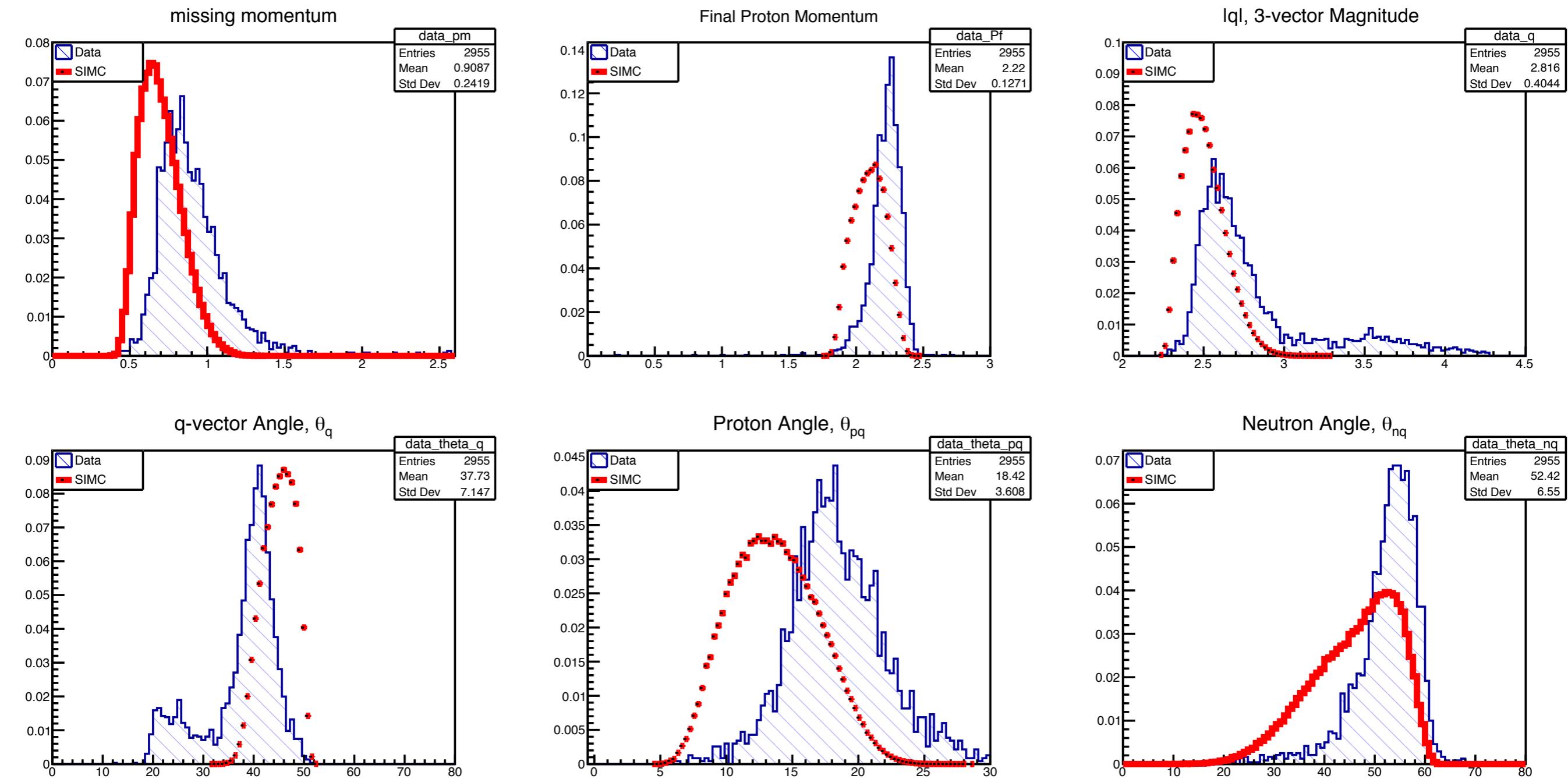
**Old SHMS
reconstruction
delta-matrix**



**Optimized SHMS
reconstruction
delta-matrix**



Kinematic Setting: 750 MeV Missing Momentum



Still, a lot of work need to be done before analysis . . .

- * Observed offsets need to be corrected
- * Detector calibrations need to be done
- * H(e,e'p) runs taken must be used to fine tune SHMS

BackUp Slides

For detailed SIMC/Data comparison of E12-10-003, follow this link:

https://hallcweb.jlab.org/wiki/images/7/70/FirstLook_DataSIMC_Deut.pdf

For detailed Simulation Results of E12-10-003, follow this link:

https://hallcweb.jlab.org/wiki/images/6/64/Updated_Yield_Estimates_PDF.pdf

Thank You!

Questions?