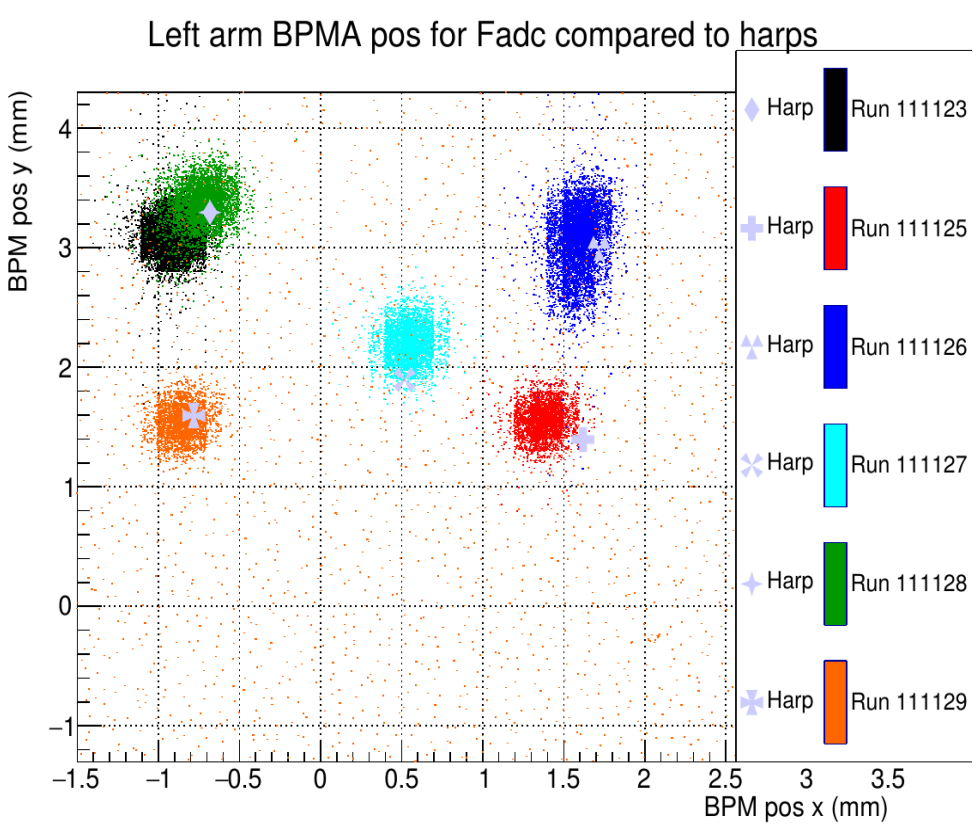
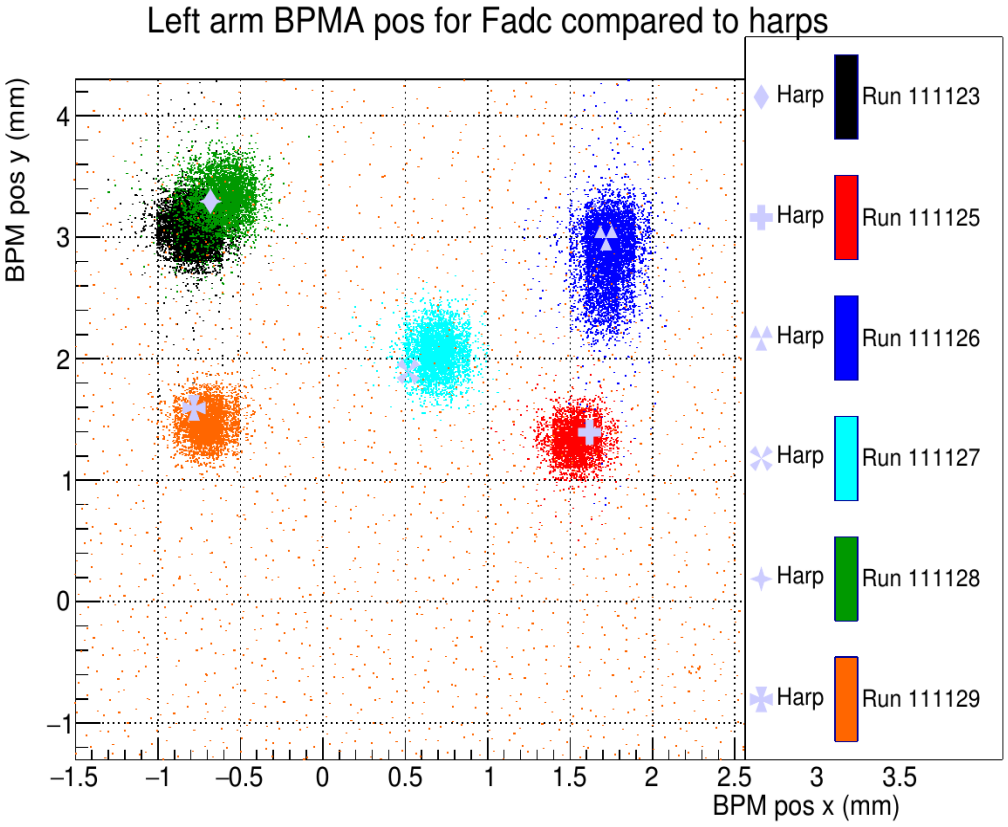
EMC effect in A=3

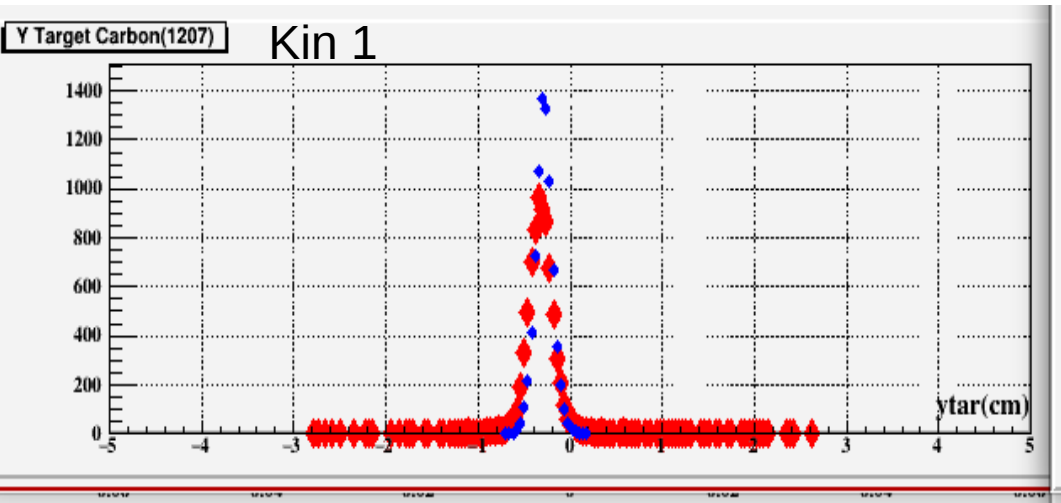
Overview of work since last Analysis Day

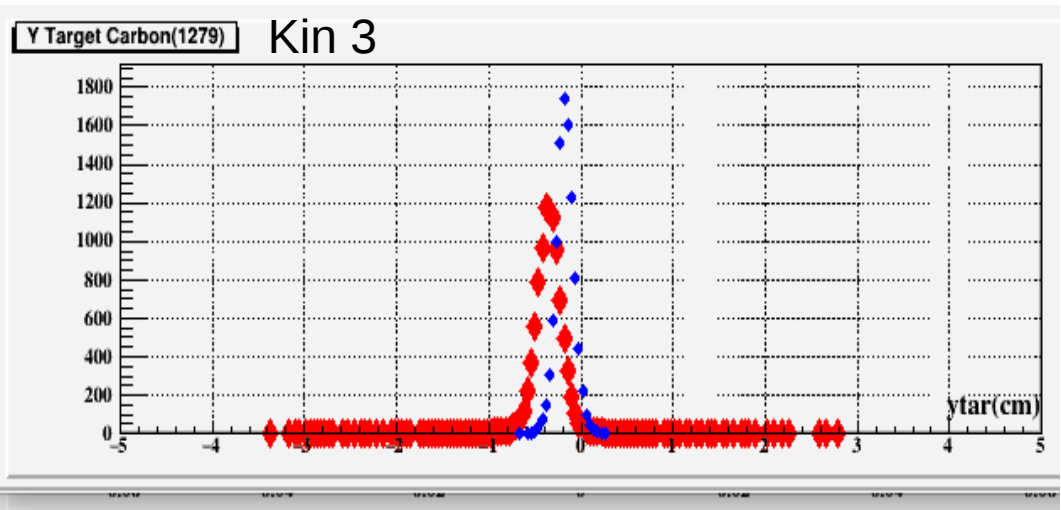
- Preparing for DNP Oct -30th
- Preparing for PhD committee meeting Nov -30th
  - Working to defend in the Fall
- Week of RC! And BPM calibration for (e,e`k)
- Monte Carlo tuning
- Detector Efficiency →SQL
- EMC effect Calculation

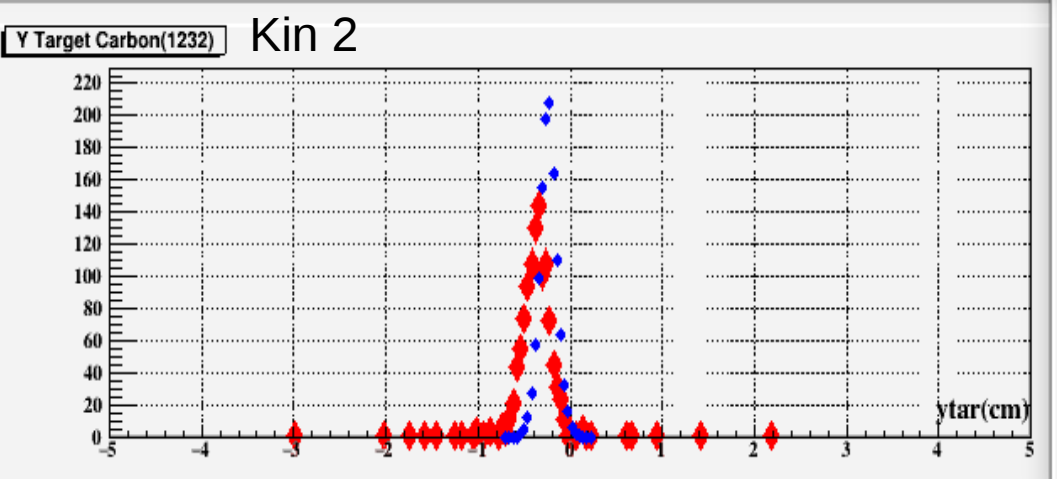
BPM Before and After

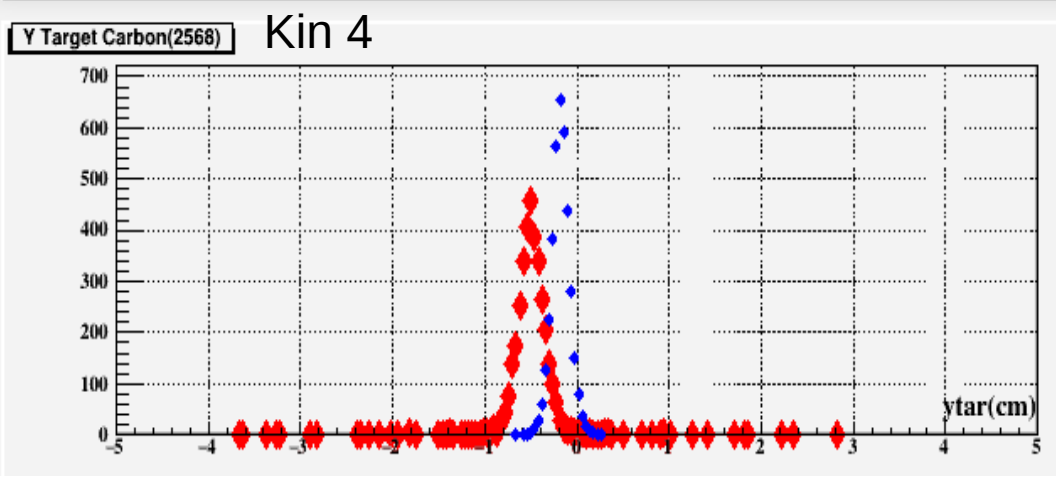




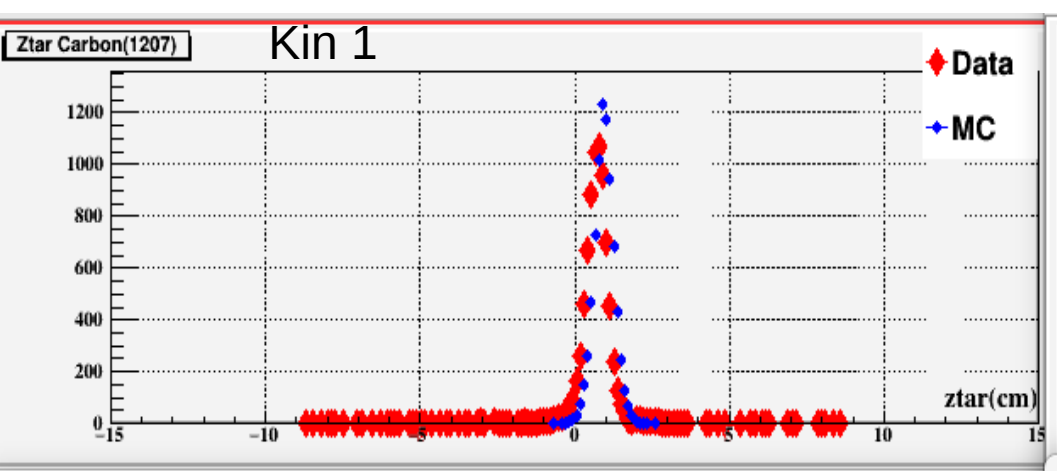


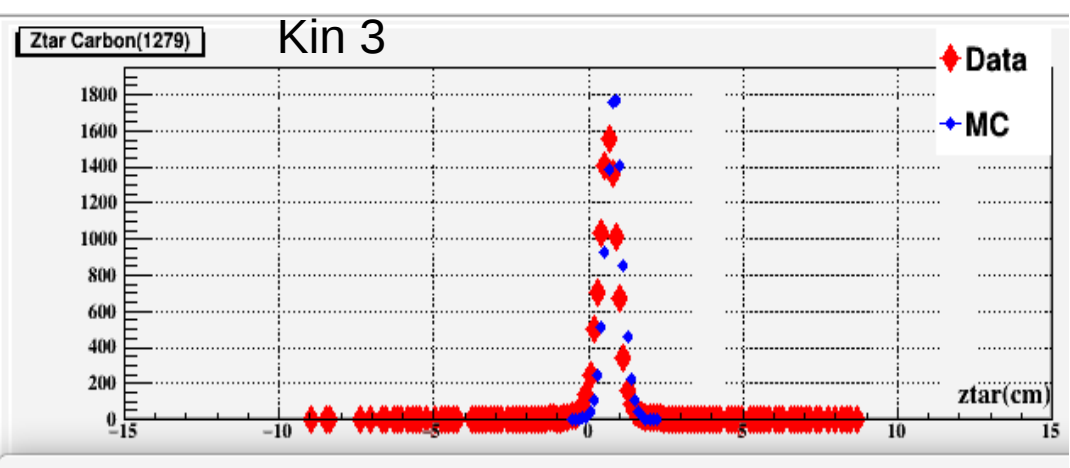


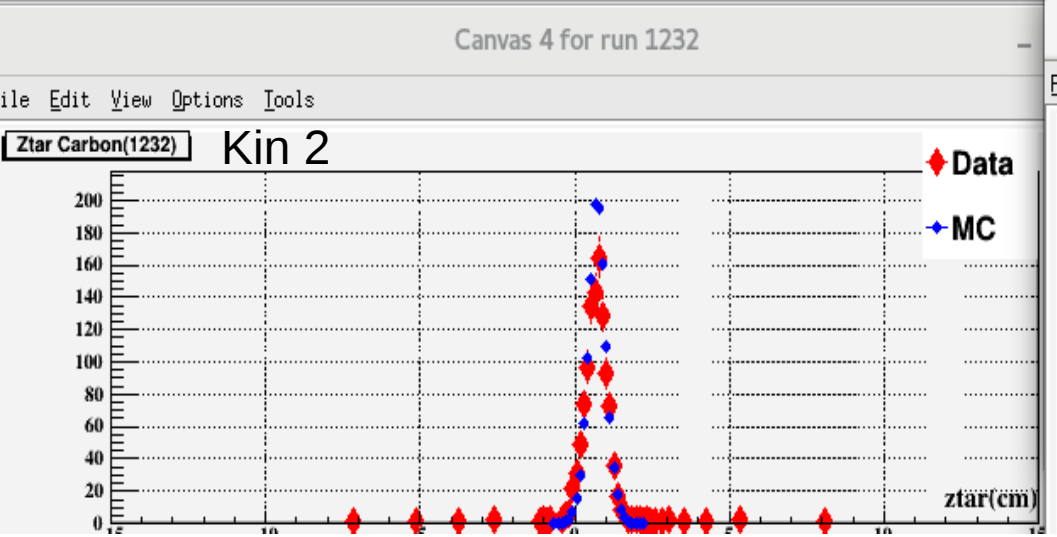


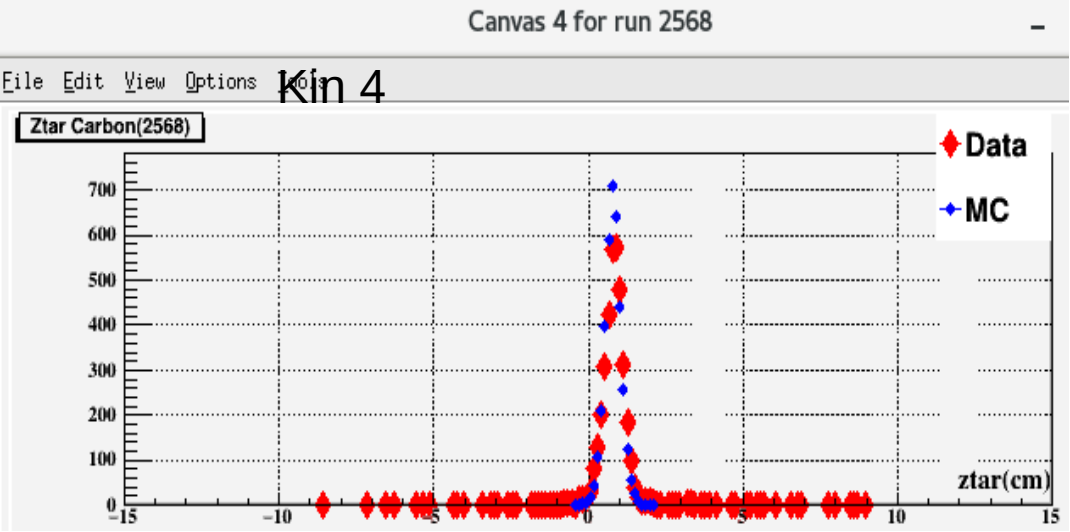


Noticed an offset in Y target between MC and data that differences over kinematic.



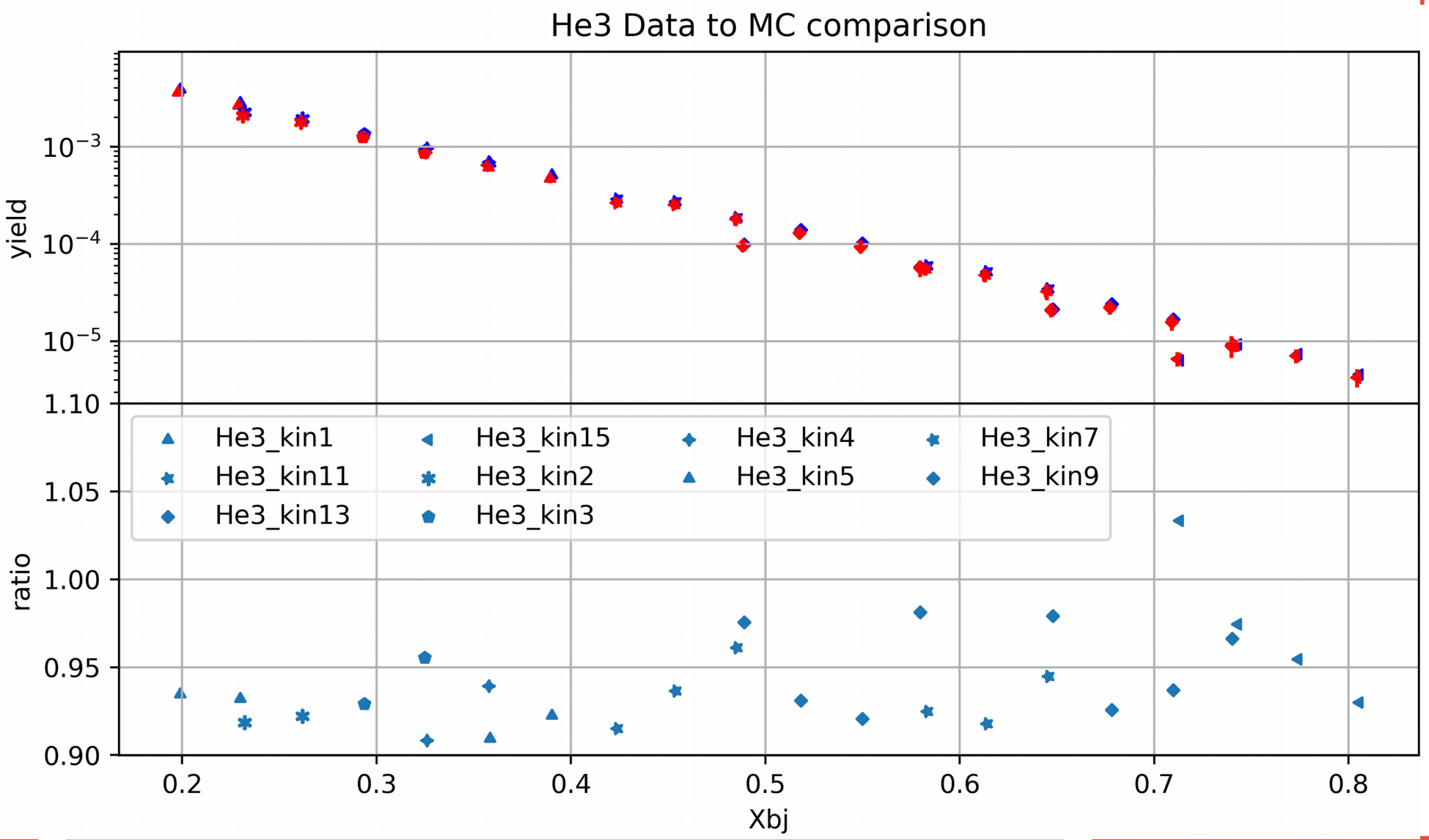




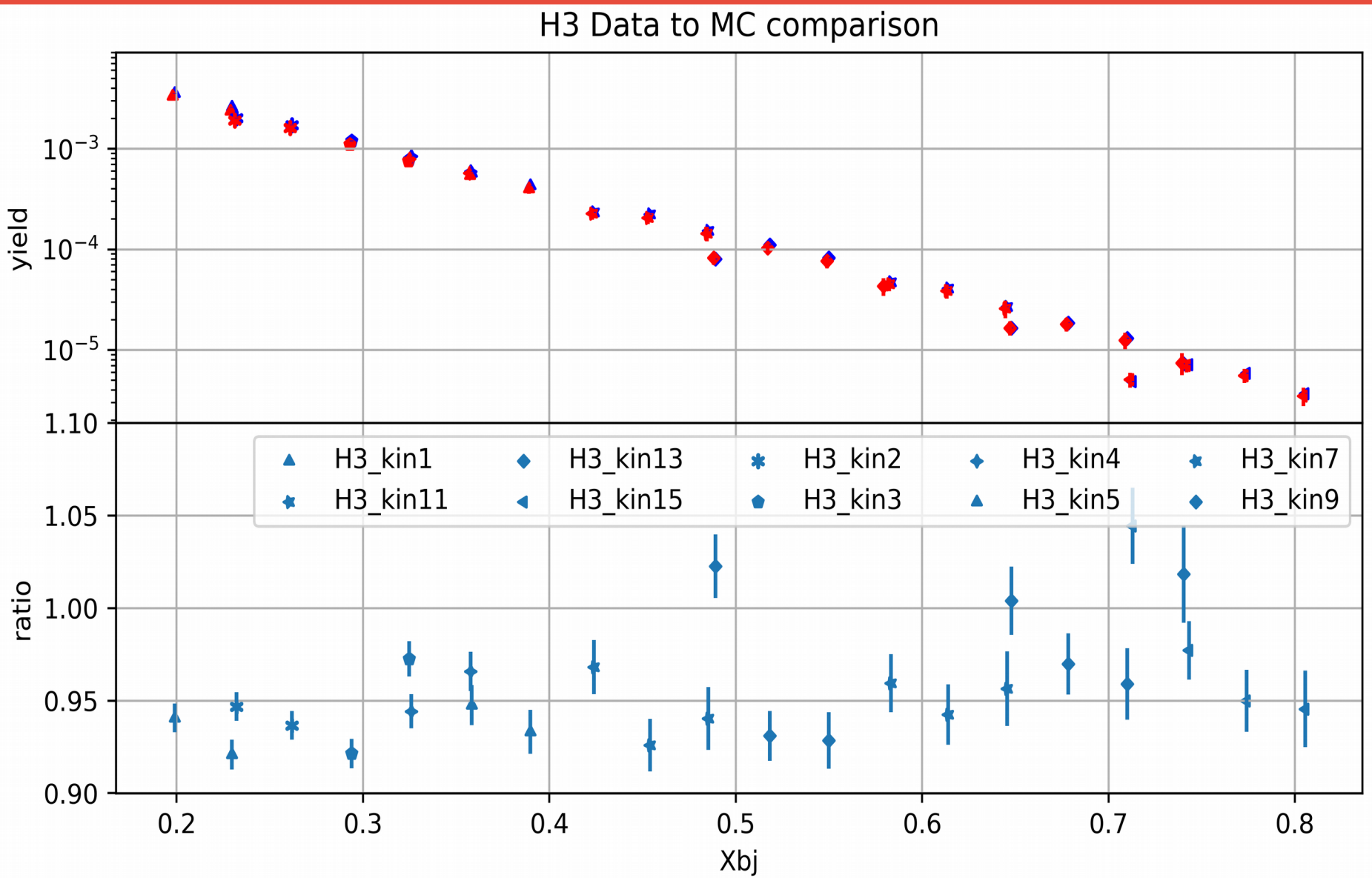


The offset is not present in the z target. Could still be a beam offset issue (WIP).

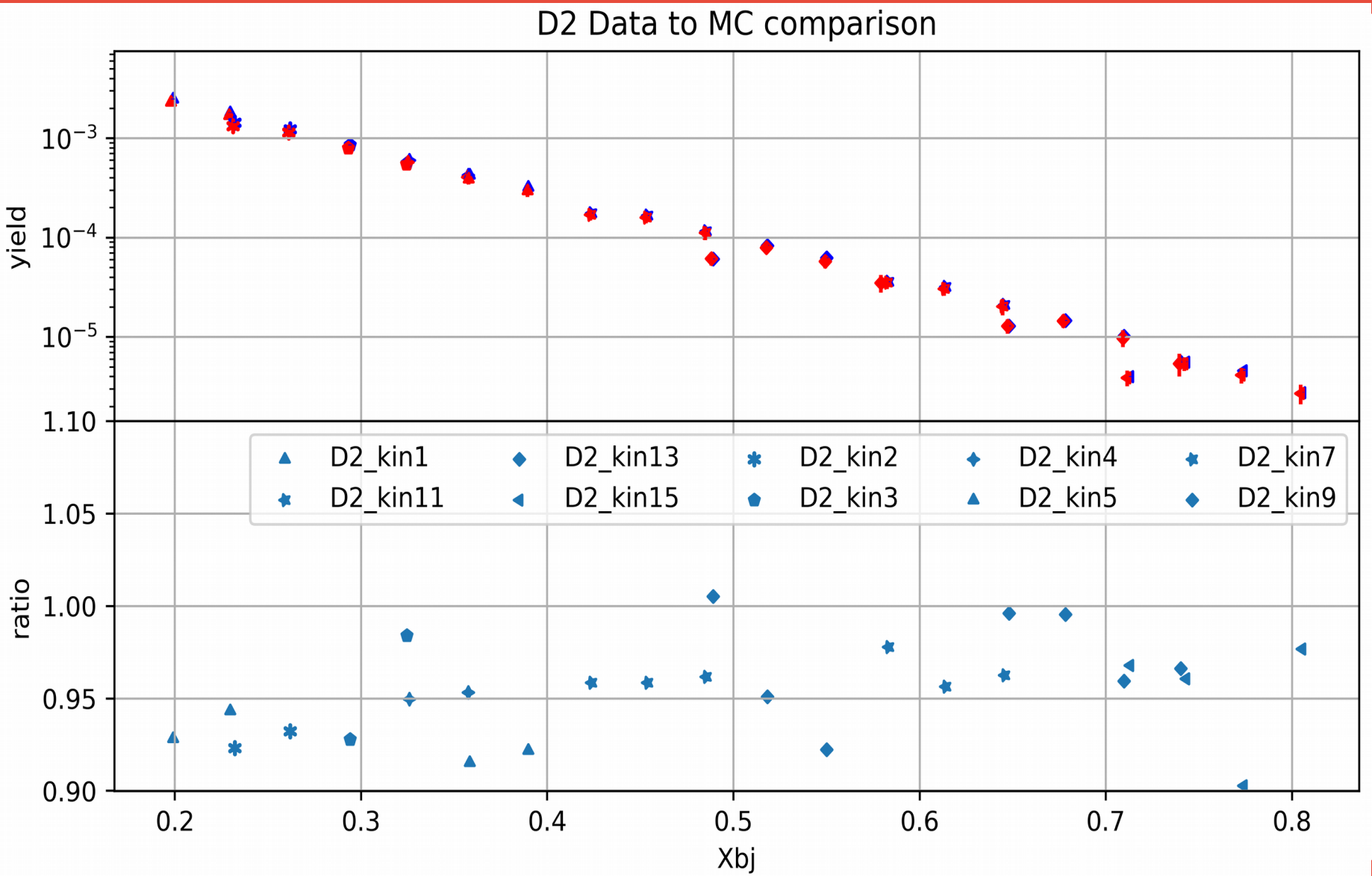
Monte Carlo to Data



Monte Carlo to Data



Monte Carlo to Data



Cross section

$$N_e = L * \left(\frac{d\sigma}{d\Omega dE'}\right) * (\Delta E' \Delta\Omega)\, \epsilon * A(E'\theta) + BackGround$$

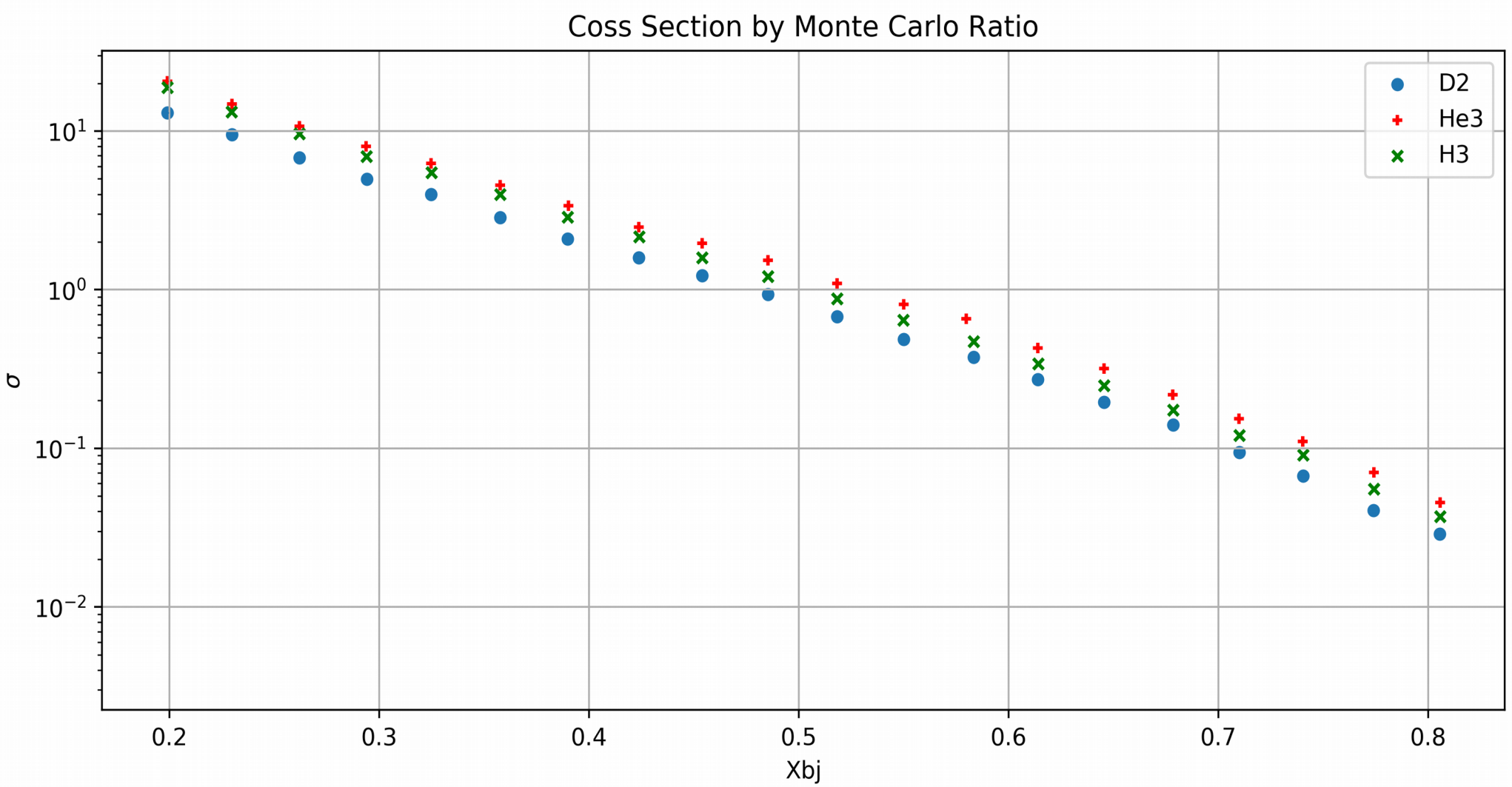
- L Luminosity $\equiv$ # of electrons per scattering centers
- $(\Delta E' \Delta\Omega) =$ size of bin
- $\epsilon =$ efficiencies
- $A(E'\theta) =$ Acceptance

$$Yield_{data} = \frac{(N_e - BackGround)}{Efficency} = L * \sigma^{data} * (\Delta E' \Delta\Omega) * A(E'\theta)$$

$$Yield_{MC} = L * \sigma^{mod} * (\Delta E' \Delta\Omega) * A(E'\theta)$$

Cross section by Monte carlo ratio method: $\frac{d\sigma}{d\Omega dE'} = \sigma^{mod} * \left[\frac{Yield_{data}(E',\theta)}{Yield_{MC}(E',\theta)}\right]$

Cross section

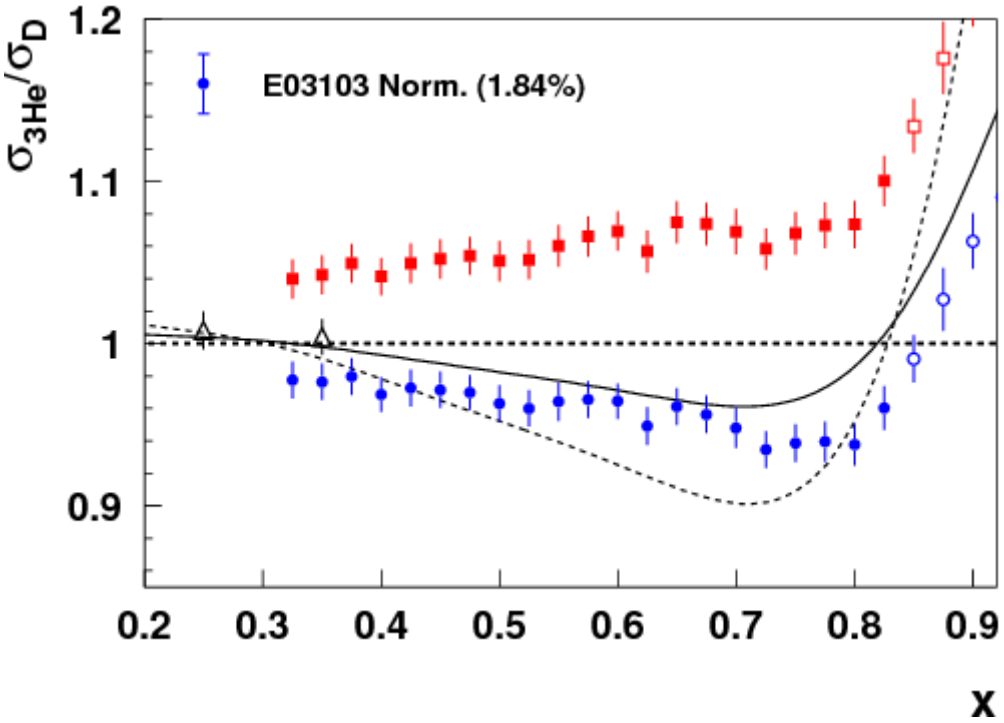


Isoscalar correction

Using F_2^n/F_2^p data from Nuclear Physics B 371 (1992) 3—31 Nuclear Physics B 371 (1992) 3—31 by the NMC- limit in X from 0.3 -0.7

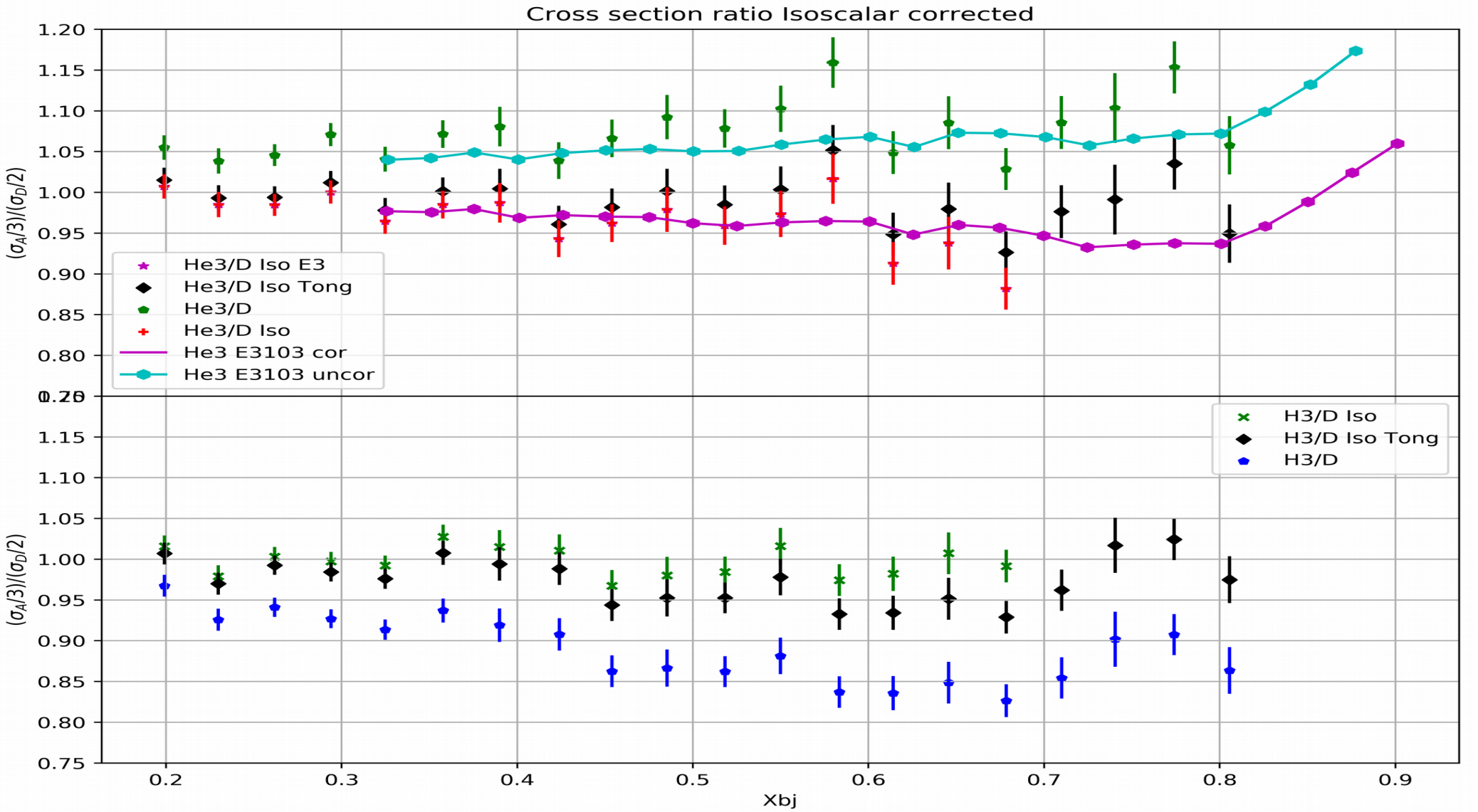
Results from Tong on F_2^n/F_2^p from MARATHON data

Comparing to results from E03103



$$f_{ISO}^A = \frac{\frac{1}{2}\left(1+\frac{F_2^n}{F_2^p}\right)}{\frac{1}{A}\left[Z+(A-Z)\frac{F_2^n}{F_2^p}\right]}$$

EMC effect


Cross section ratio Isoscalar corrected
$(\sigma_A/3)/(\sigma_D/2)$
He3/D Iso E3
He3/D Iso Tong
He3/D
He3/D Iso
He3 E3103 cor
He3 E3103 uncor
H3/D Iso
H3/D Iso Tong
H3/D
Xbj

Efficiency of the PID detectors

- How efficient is it at detected the wanted particles(electrons)?
- How many electrons are we missing out on?
- $Cer_{ele+} = N_E^{Cer} / N_E^{Cal} \rightarrow$ ele saw/ele should of seen from a sample
- Using binomial error to estimate the error on the efficiency calculation because, dealing with ratio of sub samples.
- Hanjie made similar efficiency calculations on other detectors, posted in the analysis wiki page, Link

```
mysql> select cal_eff, cal_eff_err,cer_eff, cer_eff_err  from MARATHONanalysis where
run_number = 1350;
+----------+-------------+----------+-------------+
| cal_eff  | cal_eff_err | cer_eff  | cer_eff_err |
+----------+-------------+----------+-------------+
| 0.983028 |    0.000835 | 0.986672 |    0.000705 |
+----------+-------------+----------+-------------+
1 row in set (0.00 sec)
```

Next!

- Short term!
  - Figure out the y target offset
  - Add detector and analysis efficiency into SQL
- A little further out
  - Complete more in-depth acceptance study focusing on the effect of acceptance in x_{bj}.