

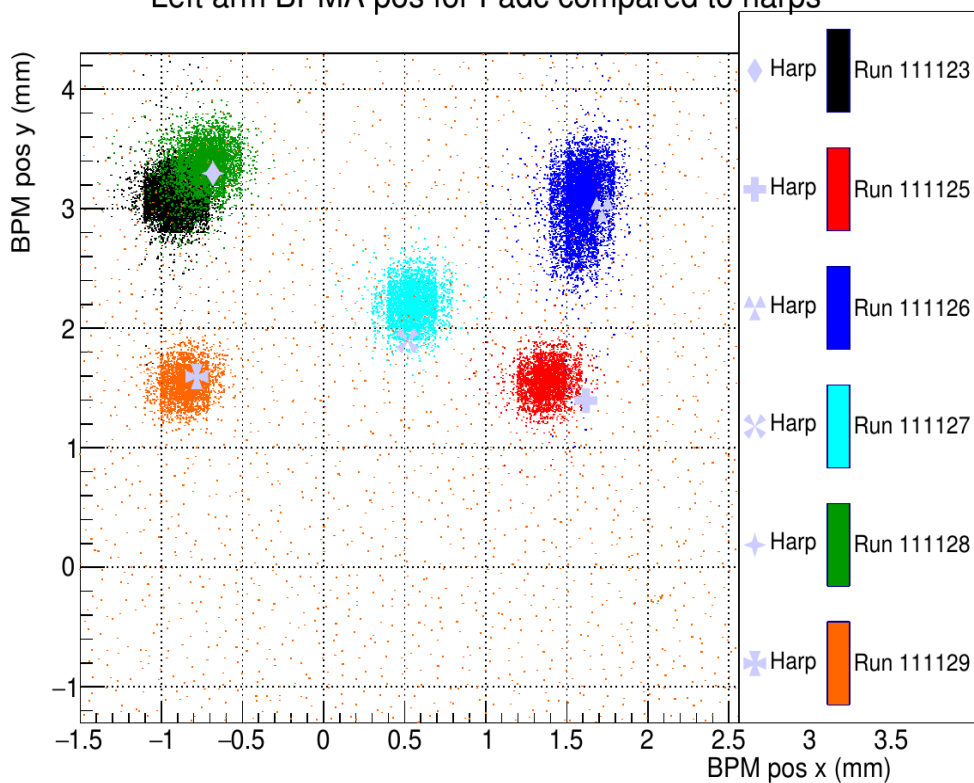
EMC effect in $A=3$

Overview of work since last Analysis Day

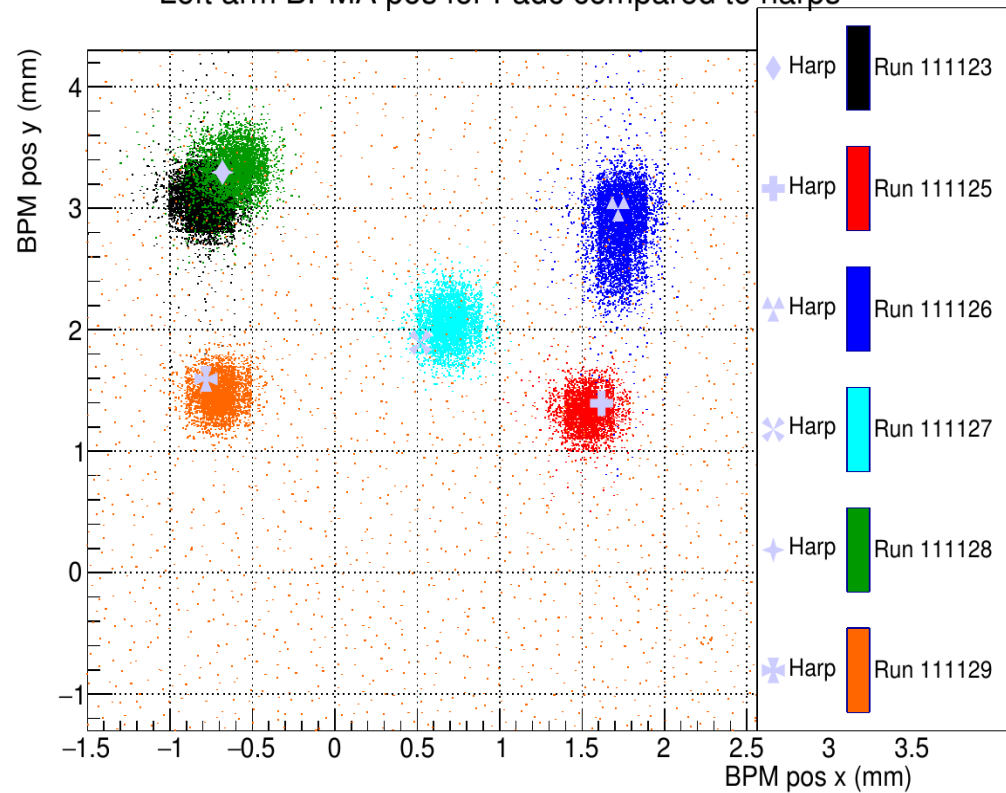
- Preparing for DNP Oct -30th
- Preparing for PhD committee meeting Nov -30th
 - Working to defend in the Fall
- Week of RC! And BPM calibration for $(e, e' k)$
- Monte Carlo tuning
- Detector Efficiency \rightarrow SQL
- EMC effect Calculation

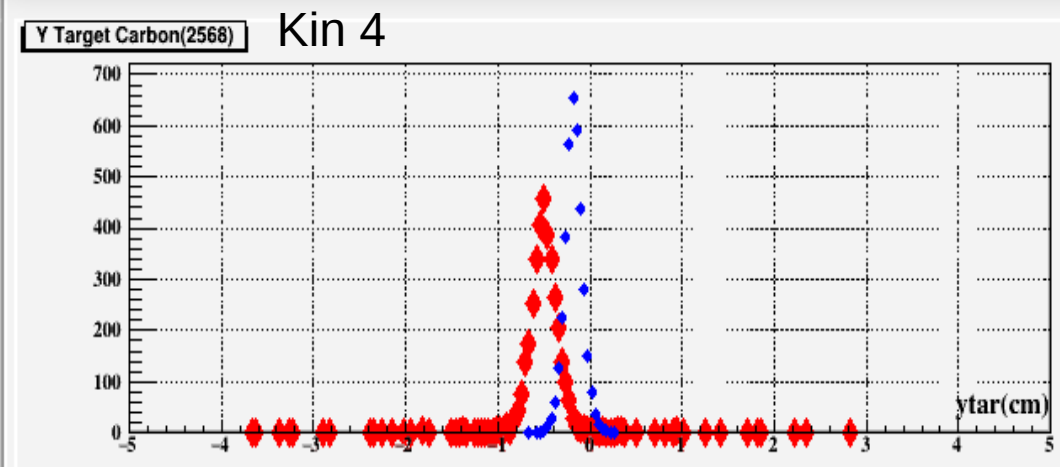
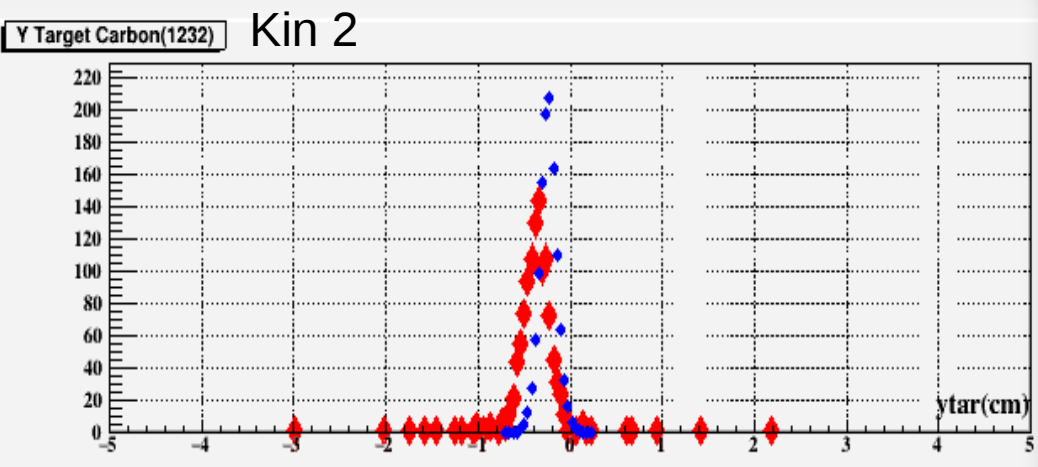
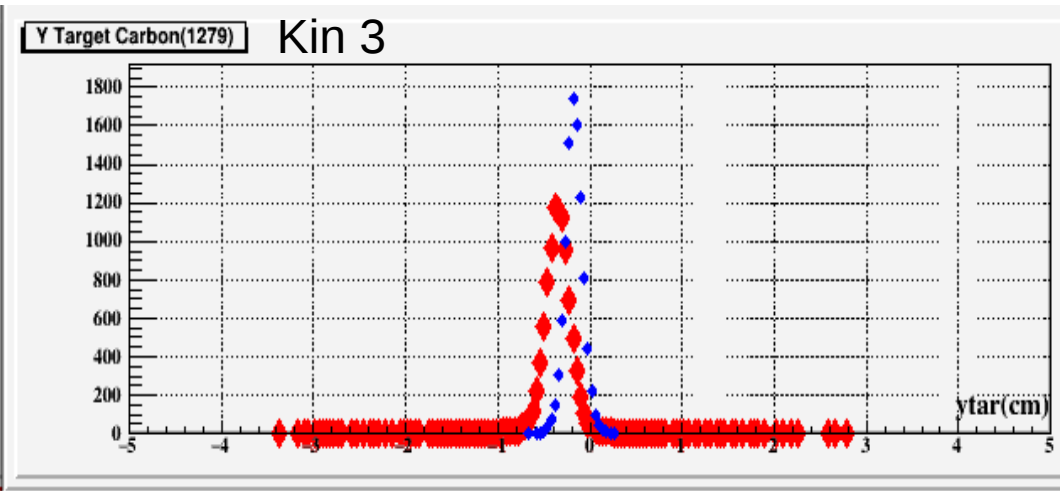
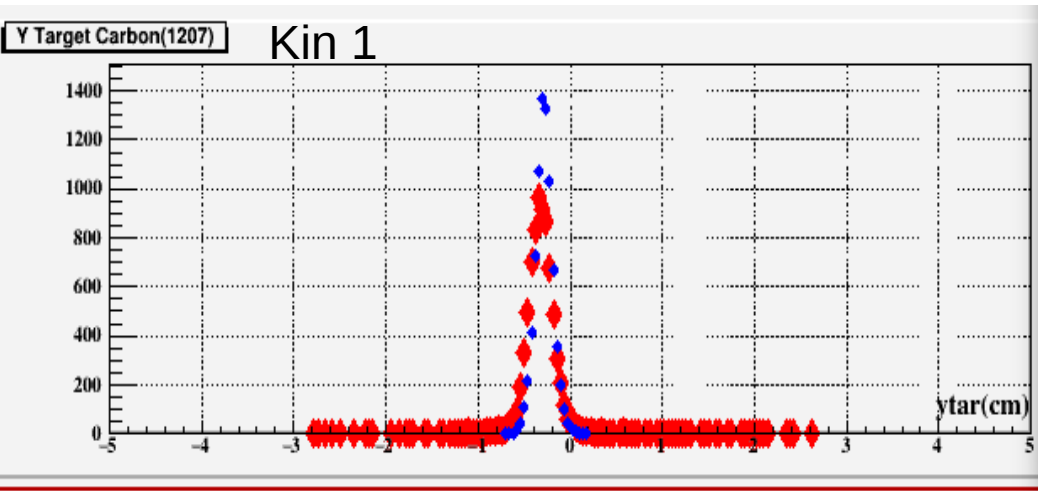
BPM Before and After

Left arm BPMA pos for Fadc compared to harps

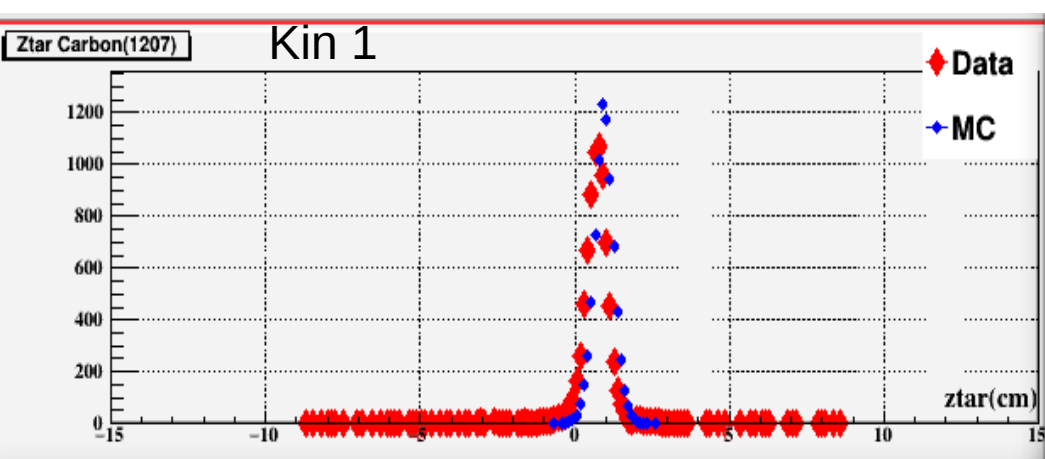


Left arm BPMA pos for Fadc compared to harps



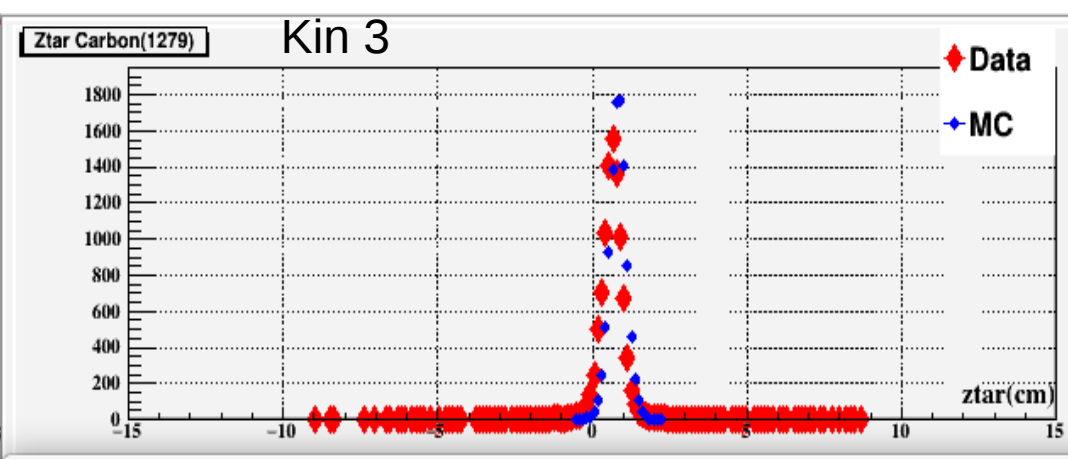
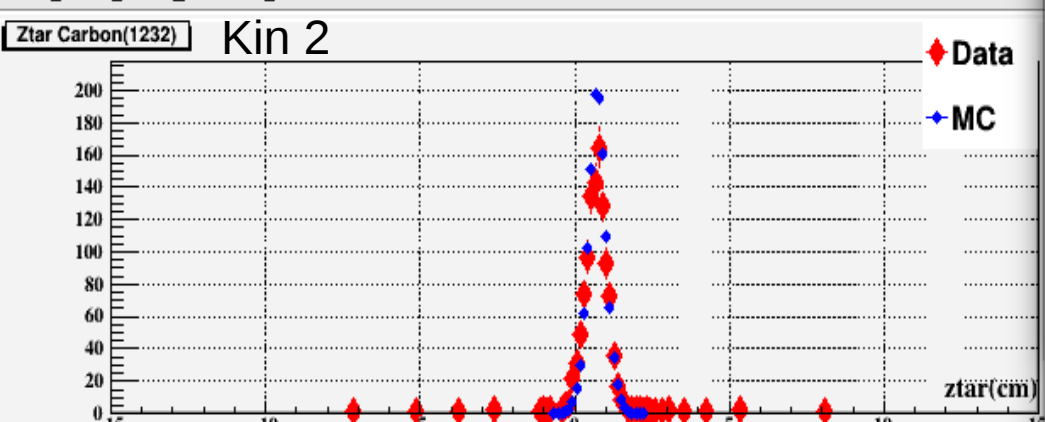


Noticed an offset in Y target between MC and data that differences over kinematic.



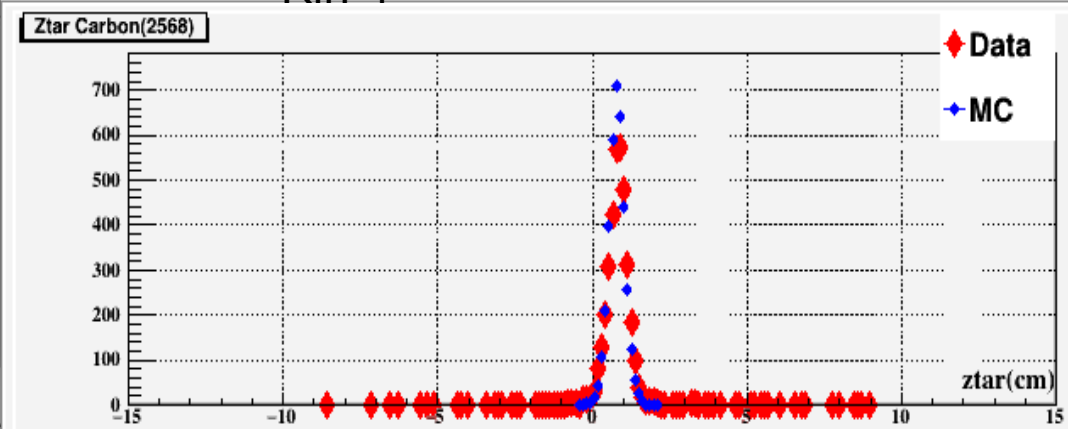
Canvas 4 for run 1232

File Edit View Options Tools



Canvas 4 for run 2568

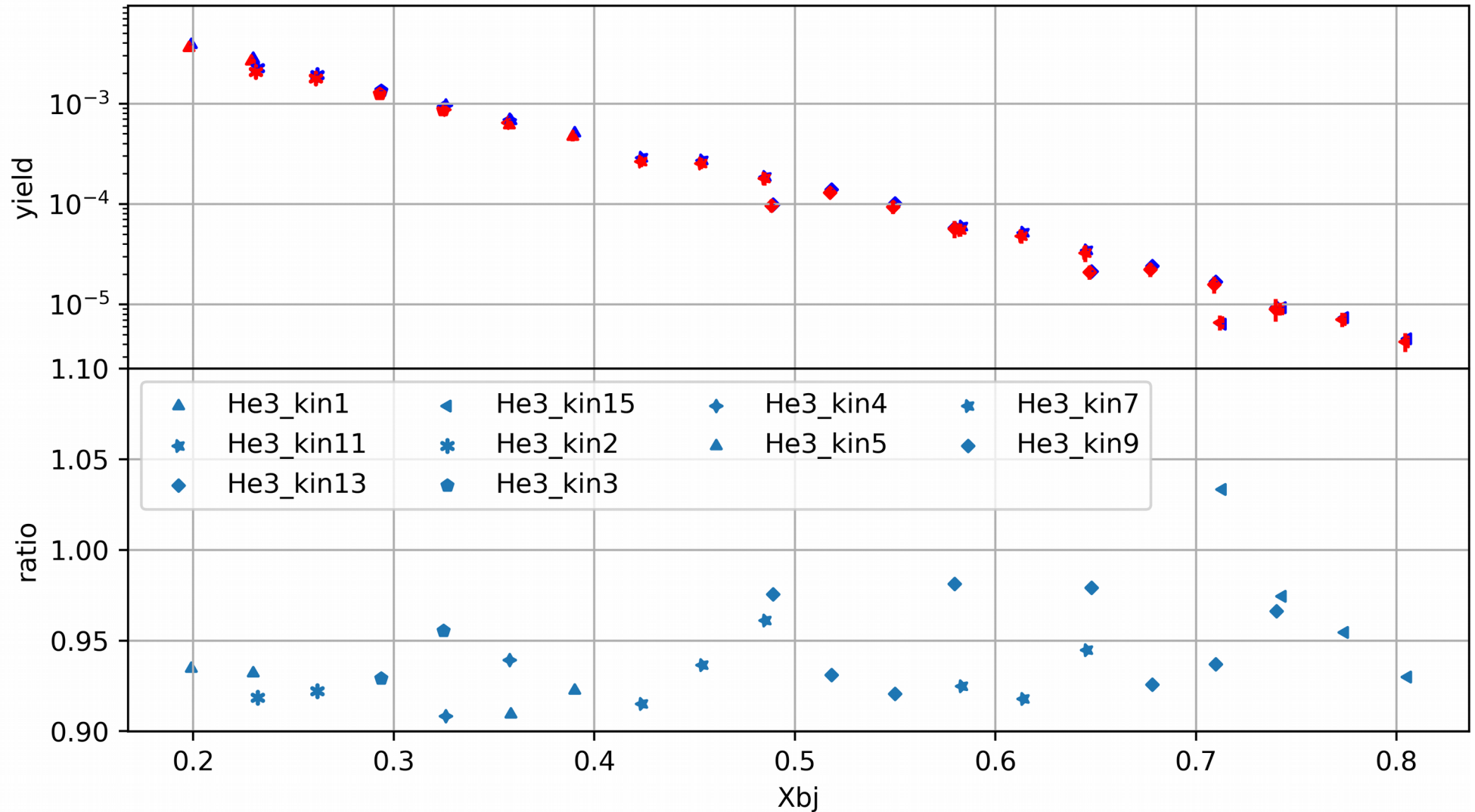
File Edit View Options Tools



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

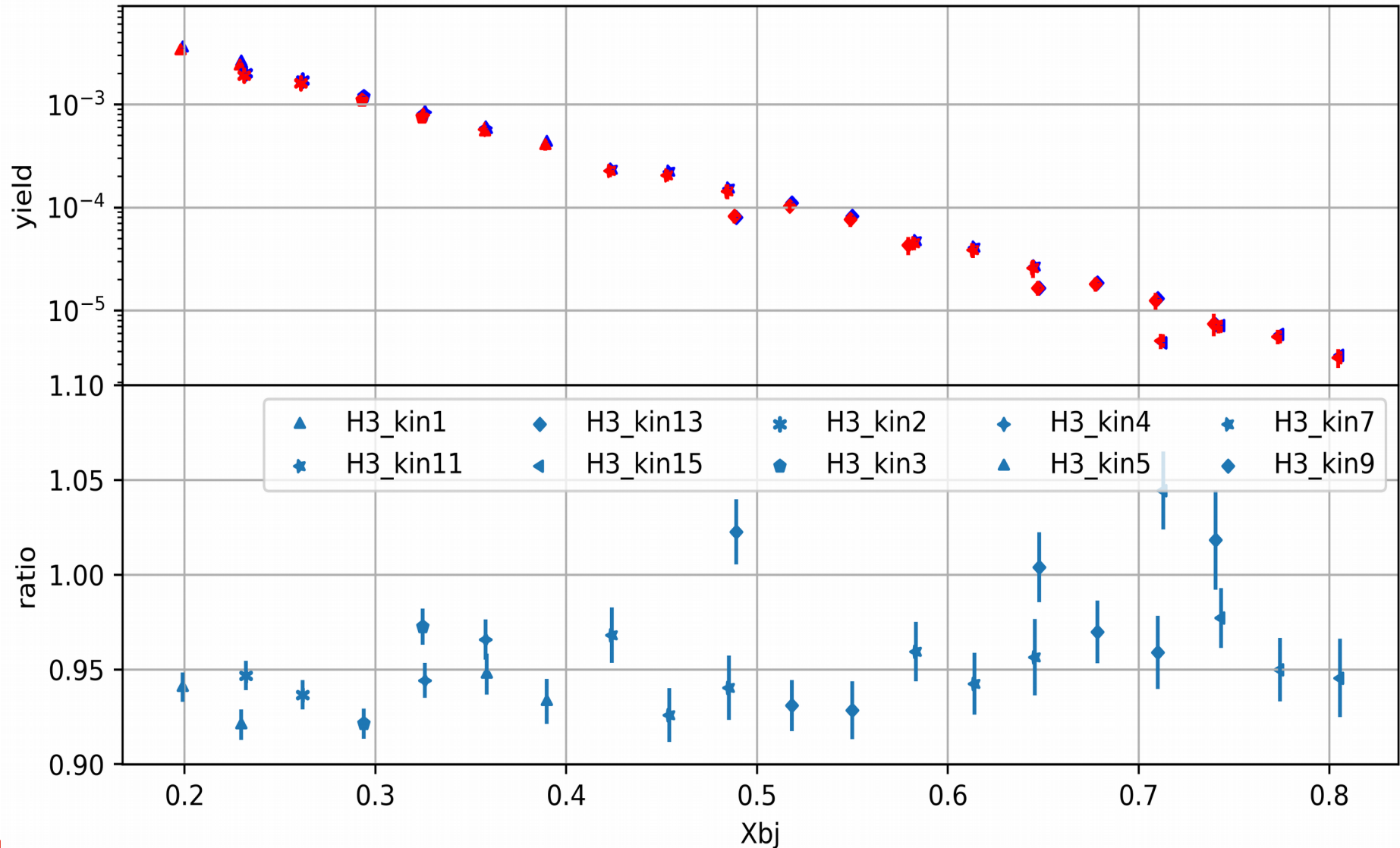
Monte Carlo to Data

He3 Data to MC comparison



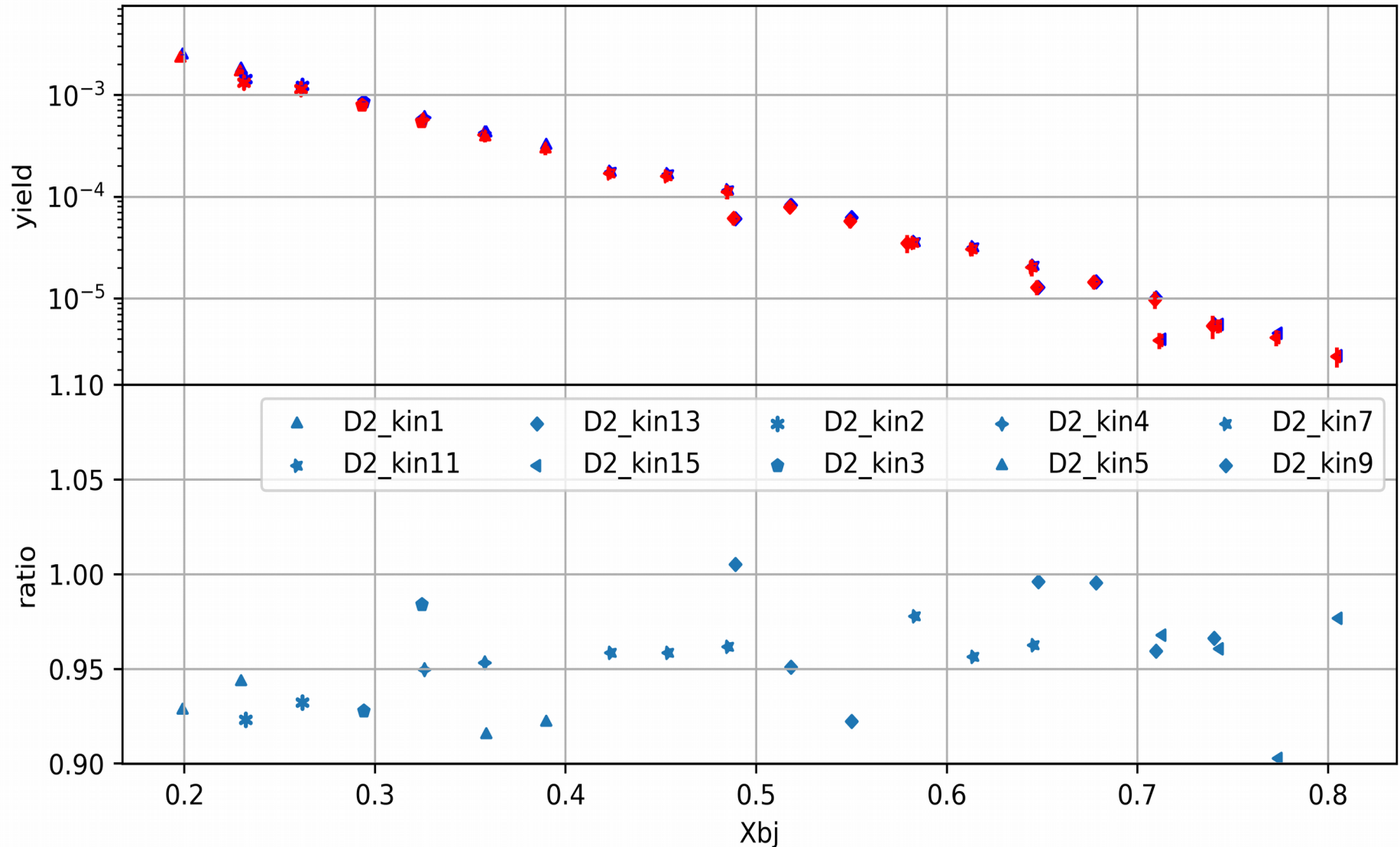
Monte Carlo to Data

H3 Data to MC comparison



Monte Carlo to Data

D2 Data to MC comparison



Cross section

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

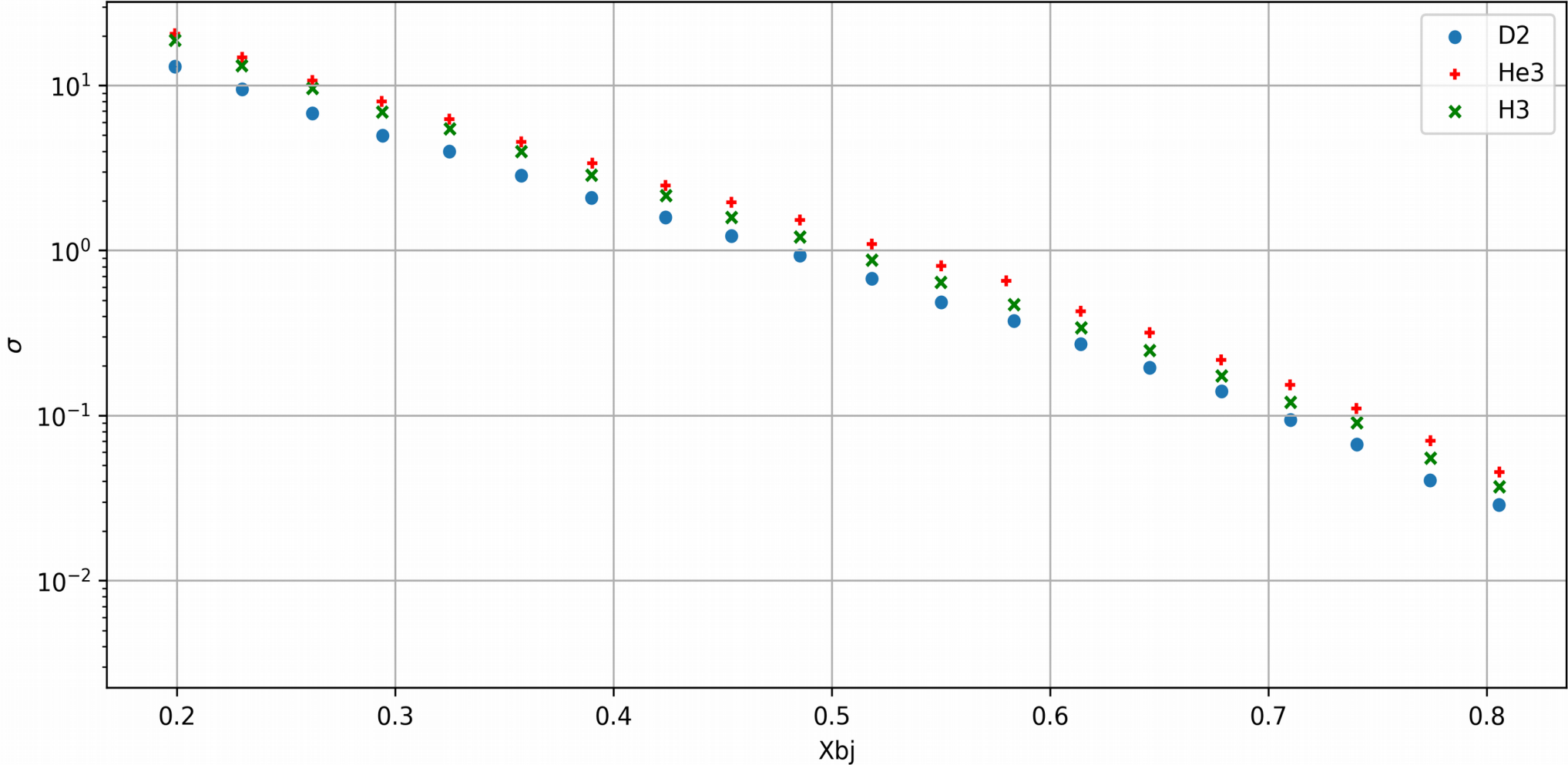
- L Luminosity \equiv # of electrons per scattering centers
- $(\Delta E' \Delta \Omega)$ = size of bin
- ϵ = efficiencies
- $A(E' \theta)$ = Acceptance

$$\text{Yield}_{data} = \frac{(N_e - \text{BackGround})}{\text{Efficiency}} = L * \sigma^{data} * (\Delta E' \Delta \Omega) * A(E' \theta)$$
$$\text{Yield}_{MC} = L * \sigma^{mod} * (\Delta E' \Delta \Omega) * A(E' \theta)$$

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

Cross section

Cross Section by Monte Carlo Ratio

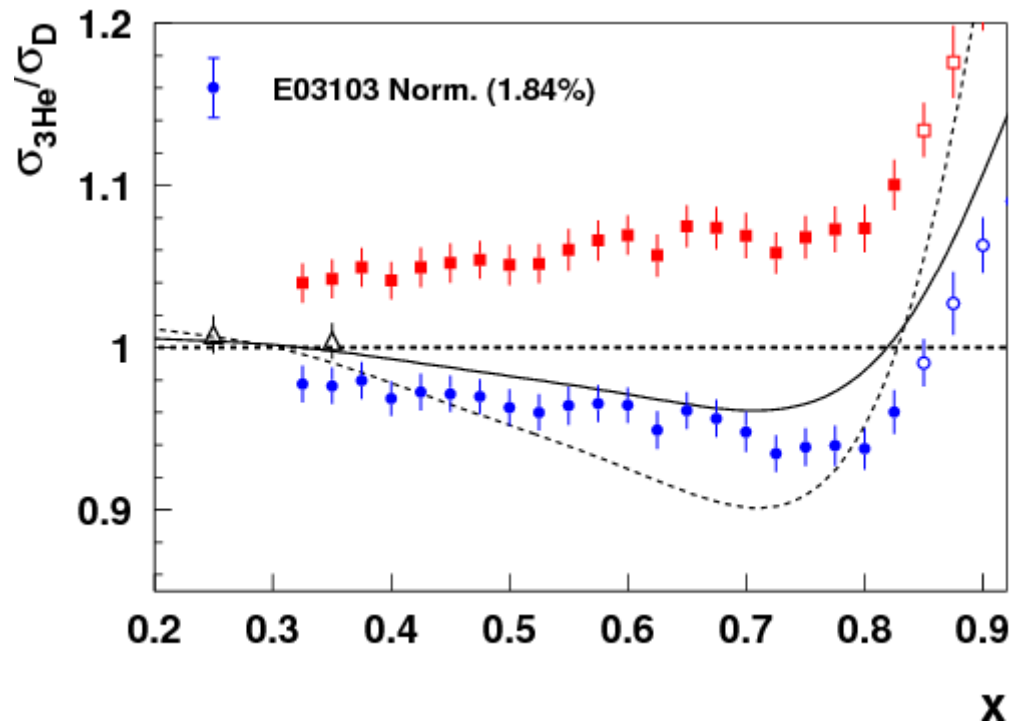


Isoscalar correction

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

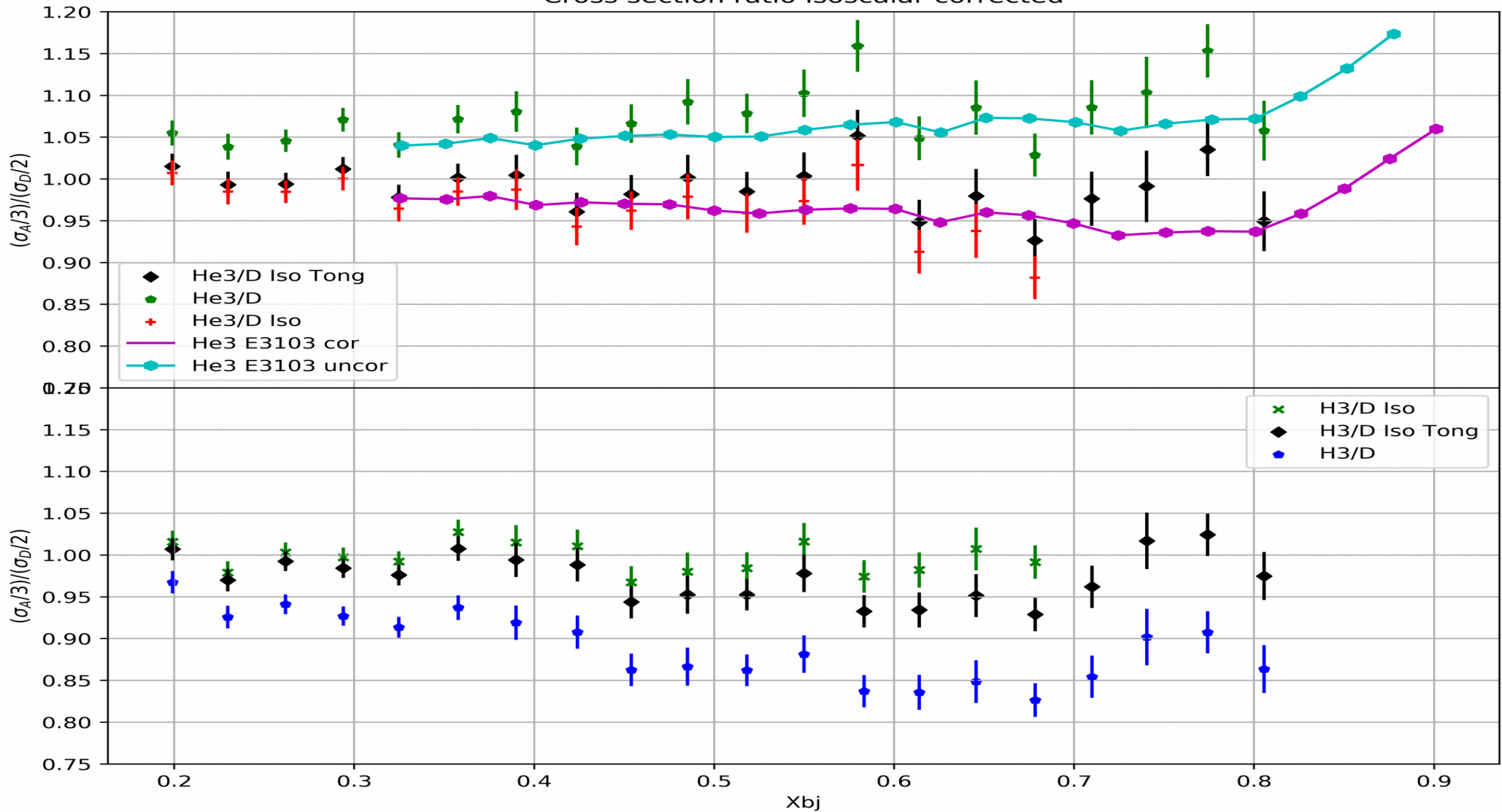
Comparing to results from E03103



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

EMC effect

Cross section ratio Isoscalar corrected



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} .

