

SIDIS status

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Issue with 10x130 files in productions 25.10.4 and 25.12.0

- Kinematics branches incorrect – at least for x and slightly for y:

```
Electron kinematics      0 x  2.01006  0.00595 Q2      1.1      1.1
y  0.0304      0.0364 InclusiveKinematicsElectron values and true
own calculation gives   x  2.00830  0.00595 Q2      1.1      1.1
y  0.0303      0.0364 (with 0,0,0,0.938)
own calculation gives   x  0.00682  0.00595 Q2      1.1      1.1
y  0.0322      0.0364 (with proton momentum taken from MCTParticle)
```

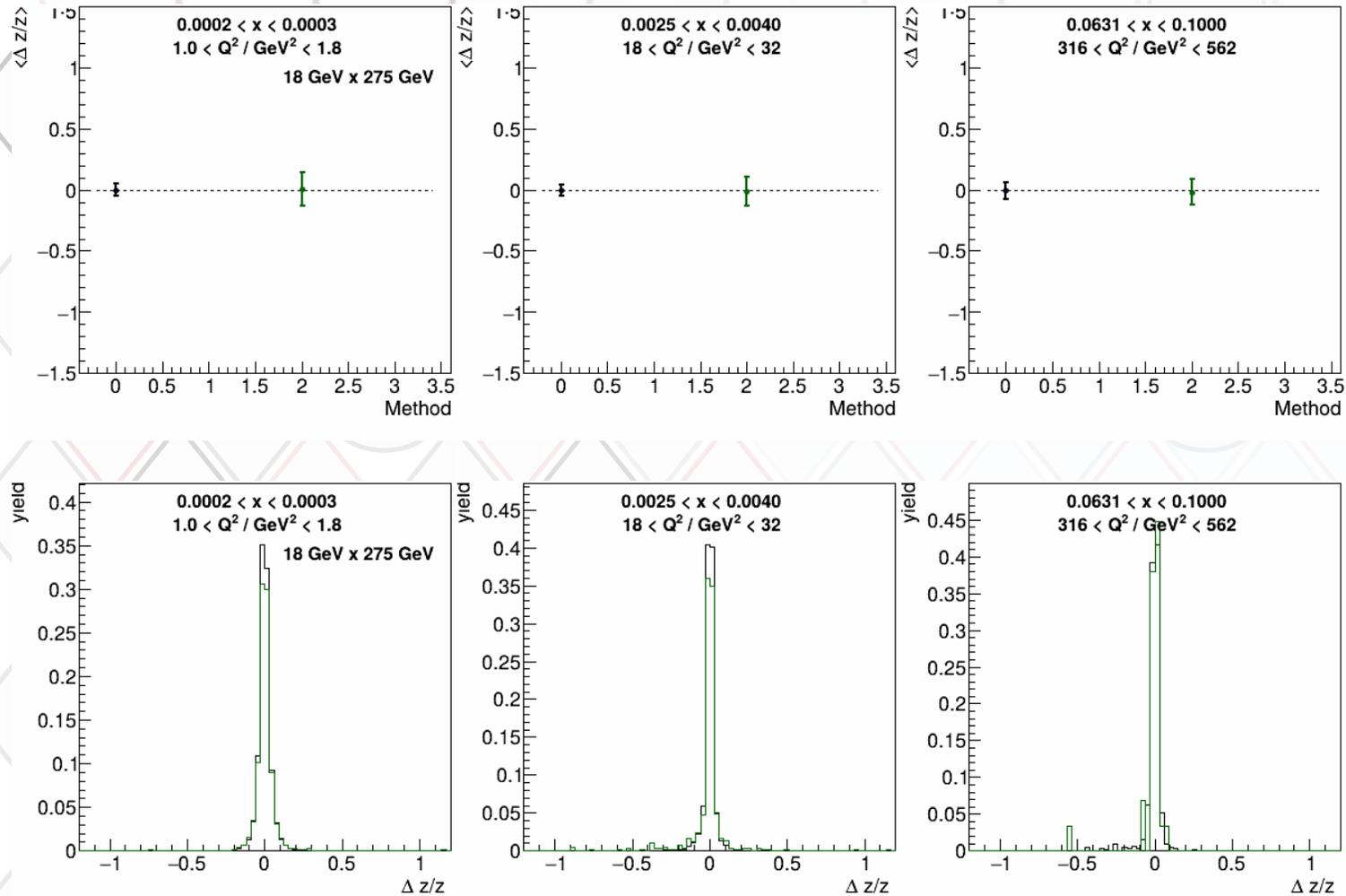
- Reason – Recocode looks for beam momentum within 10% to either 41,100, or 275 and then uses fixed beam momentum → for 130 GeV none is found, momentum set to zero
- I made Sakib aware of this, he found the bug: <https://github.com/eic/ElCrecon/issues/2542> (note: this means that 250 GeV is also slightly off and so are likely the 115 and 110 GeV e+Cu/Zr and e+D options)
- Not clear if that will be patched before March campaign
- If you use the 10x130 simulations, you need to calculate your DIS kinematics yourself until fixed!

First look at Beam background files

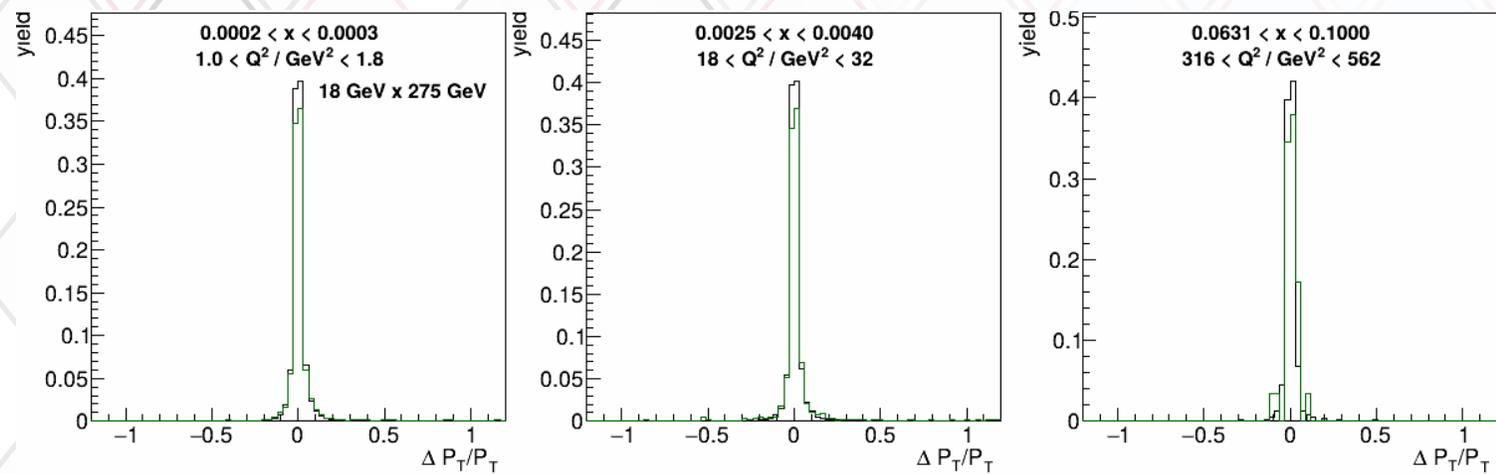
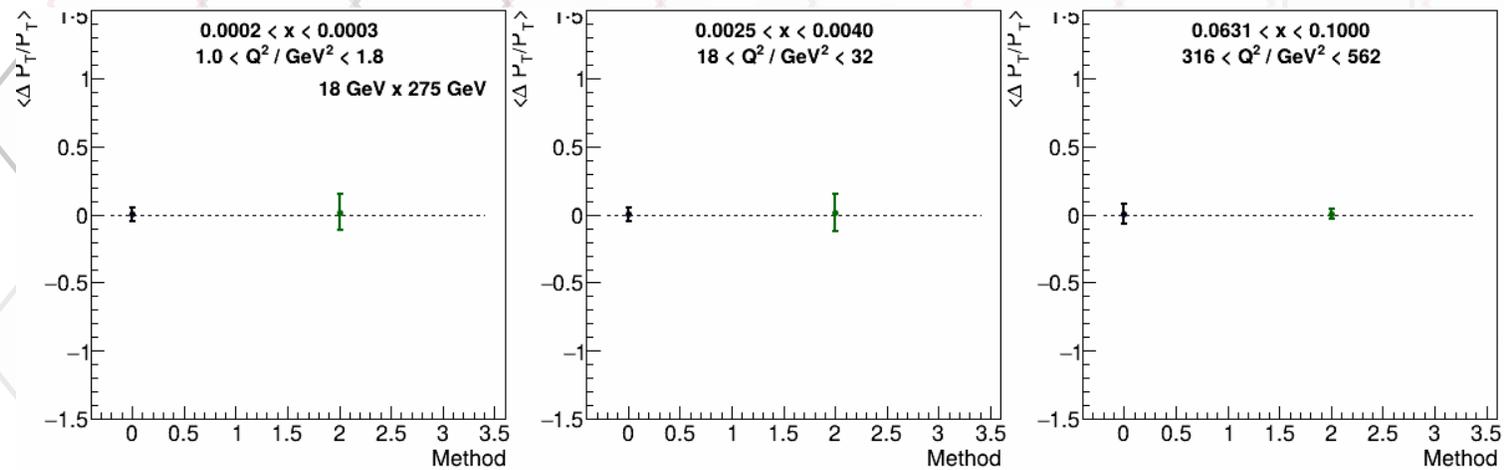
- Tried 10x275 GeV DIS/NC files $Q^2 > 1$ and similar files with Bkg_Exact_2us/GoldCt/[5,10] μm
- Used Electron kinematics
- Statistics in BG samples is very limited
- Not studied: impact of background on PID

Z resolutions

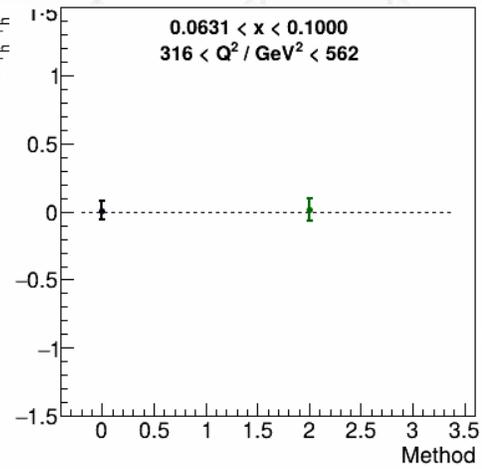
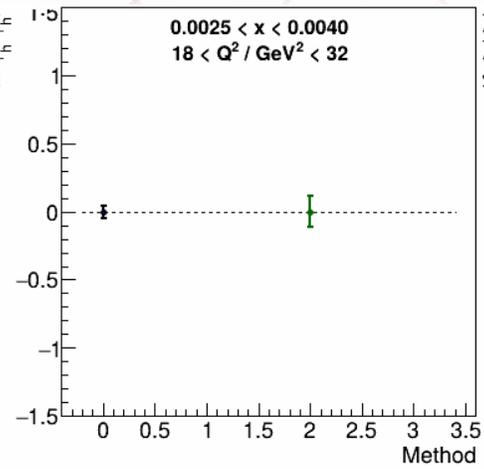
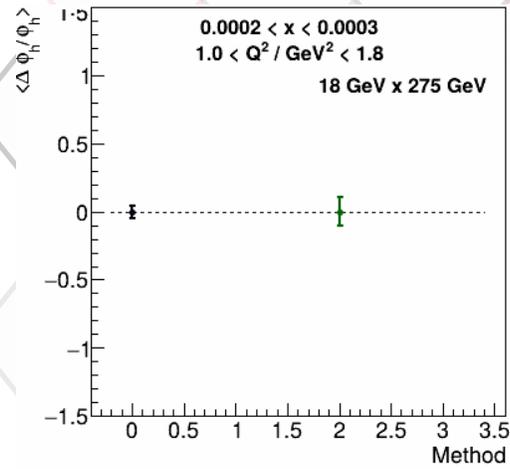
Method 0: default,
no background
Method 1: 5 μ m
(not filled yet)
Method 2: 10 μ m



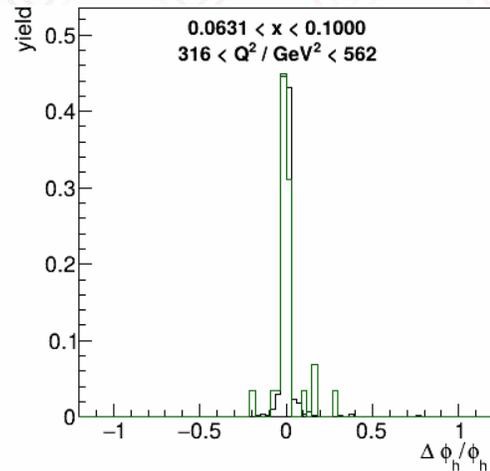
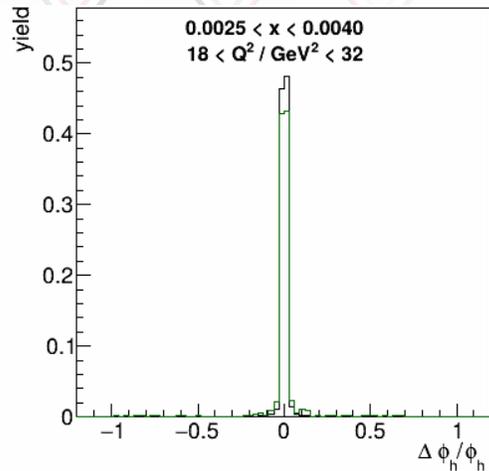
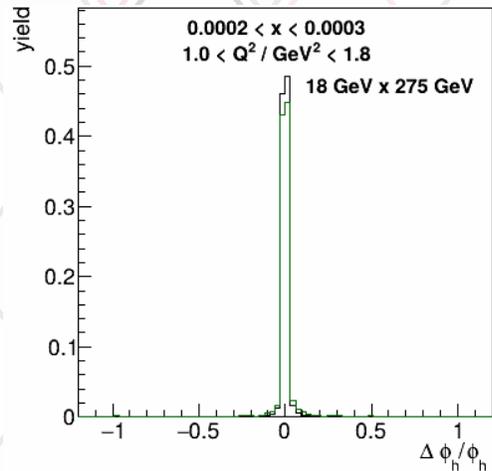
P_{hperp} resolutions



ϕ_h resolutions



Conclusion from SIDIS variable resolutions:
Not enough statistics – potentially a little wider distributions not drastically so



Other things

- Cross sections of 10x130 and 10x250 Pythia simulations from campaigns has some issue in log files for higher Q2 bins:
https://github.com/eic/InclusiveEarlyScienceSamples/tree/main/more_stat_metadata
- Stephen is aware of it and sees similar cross sections when running smaller samples, will add summary with appropriate xsecs

```
// Stephen  
{0.7092, 5.97557E-02, 2.28653E-03, 23.62} //10x250  
{6.394E-01, 4.718E-02, 1.515E-03, 79.27} //10x130  
//RCS  
// {0.7092, 5.97E-02, 2.21E-03, 2.62E-005} //10x250  
// {0.639, 4.72E-02, 1.45E-03, 7.90E-006} //10x130
```

- Old SIDIS Pythia6 10x100 and 18x275 simulations have been added to the simulation requests by Win Lin – possibility to compare Pythia6 and 8