

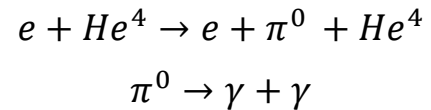
Asymmetry in coherent, virtual pion production on ^4He

An Analysis Update

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On behalf of eg6 run group

Introduction



Detected electron and photons in Inner Calorimeter using accidental events

Beam spin asymmetry in the electroproduction of a pseudoscalar meson or a scalar meson off the scalar target Chueng-Ryong Ji, Ho-Meoyng Choi, Andrew Lundeen, and Bernard L. G. Bakker, Physical Review D 99, 116008 (2019)

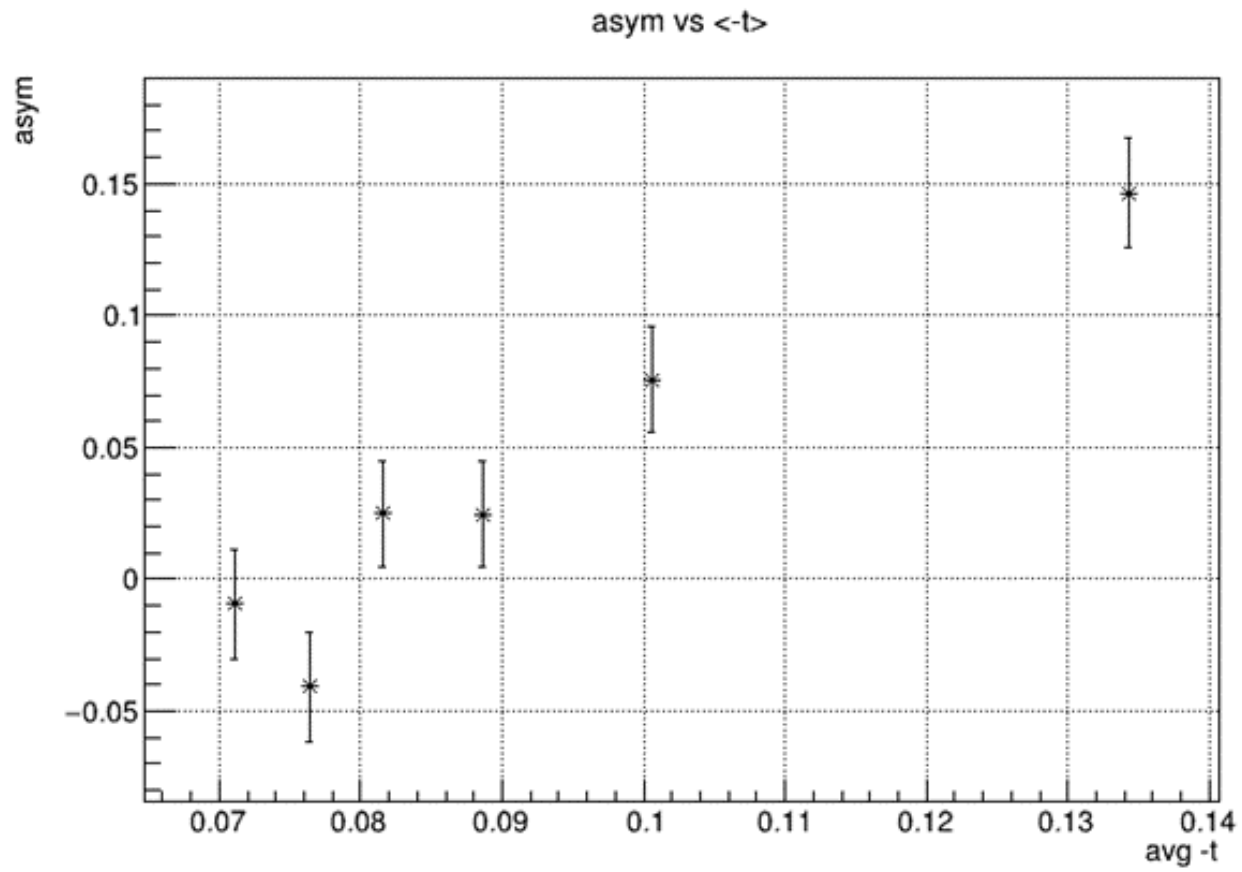
Beam Spin Asymmetry:

$$\frac{d\sigma_{\lambda=+1}^{PS} - d\sigma_{\lambda=-1}^{PS}}{d\sigma_{\lambda=+1}^{PS} + d\sigma_{\lambda=-1}^{PS}} = 0.$$

Asymmetry prediction assumes coherent reaction

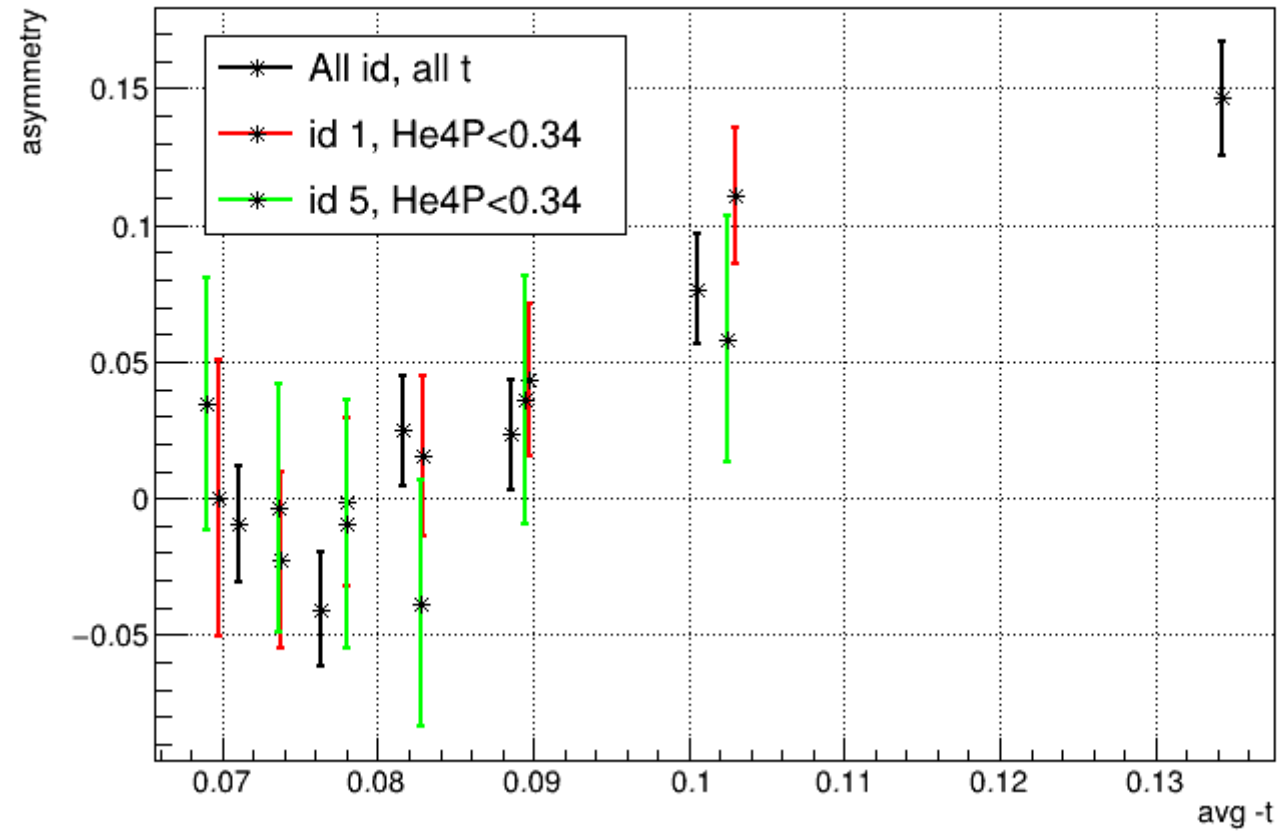
Asymmetry with t binning

- No cuts on dE/dx for recoil He
- Is nonzero asymmetry due to incoherent events?
- Exclusive cuts for high $-t$ events looks the same as with all events



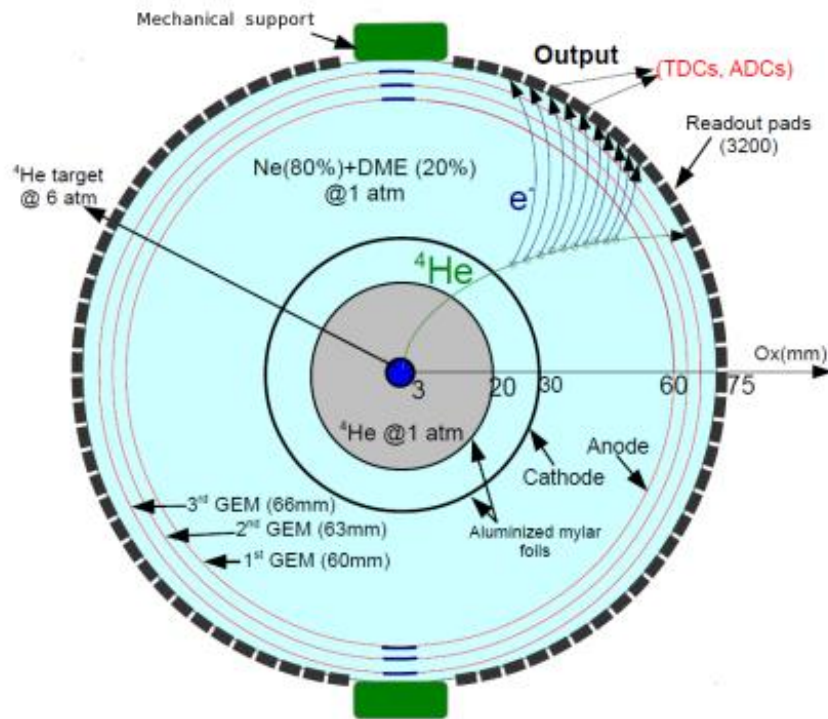
Asymmetry comparison for different dE/dx id's

Comparison of asymmetry with different values of He ID



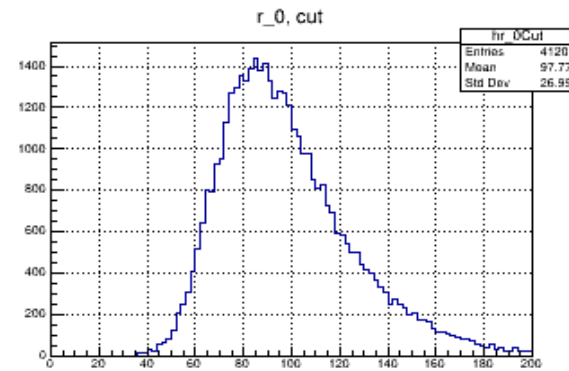
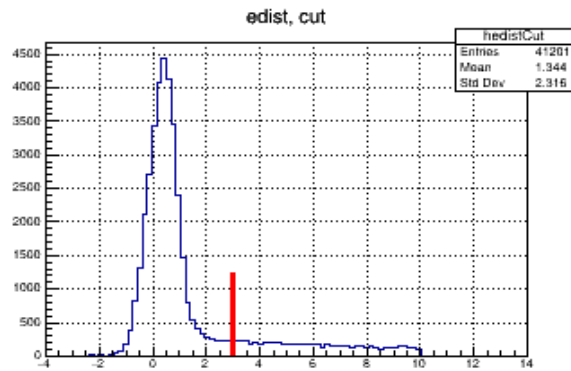
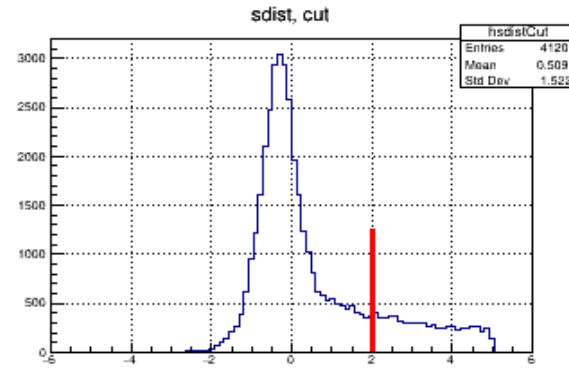
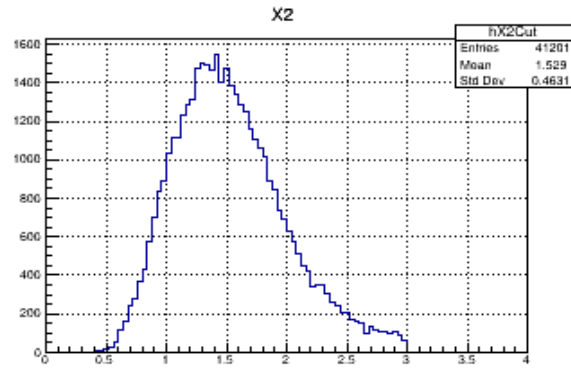
RTPC tracking

Analysis note, Deeply virtual Compton scattering off ^4He (EG6 run) M. Hattawy , N. Baltzell , R. Dupré , H. Egiyan , L. El Fassi , F.-X. Girod, K. Hafidi , C. Moody ,and S. Stepanyan (2018).

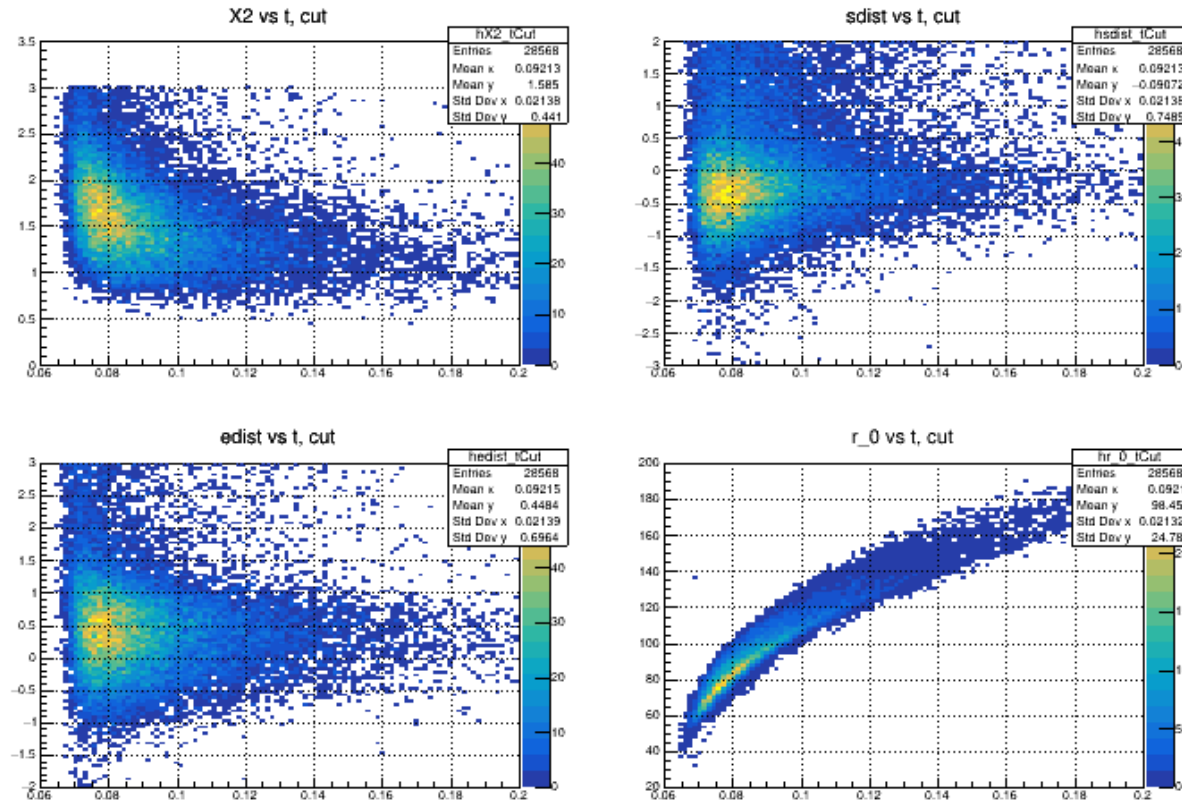


1. X^2 , The chi square for the fit of a helix to the ionization track
2. s_{dist} , the distance between the cathode and the first ionization point in the chain of ionization points of the track in the drift gas.
3. e_{dist} , the distance between the anode and the last point in the ionization chain
4. r_0 , the radius of curvature

Tracking parameters for events passing exclusive cuts. The red lines show the position of cuts on *sdist* and *edist*.



Tracking parameters vs t. The histograms have been calculated after taking the cuts on sdist and edist



As t increases,

1. The x_2 improves as t increases
2. The width of $sdist$ and $edist$ distributions narrow with increasing t .
3. The radius of curvature r_0 increases with increasing t , as expected for the bending of the track as its momentum increases.

Conclusion

The measured value of the asymmetry disagrees with the predicted value as $-t$ increases

The asymmetry at large $-t$ does not seem to be related to the formation of an incoherent final state

Analysis note in preparation