How well can we determine the cross session central value when reconstruct only to the target plane

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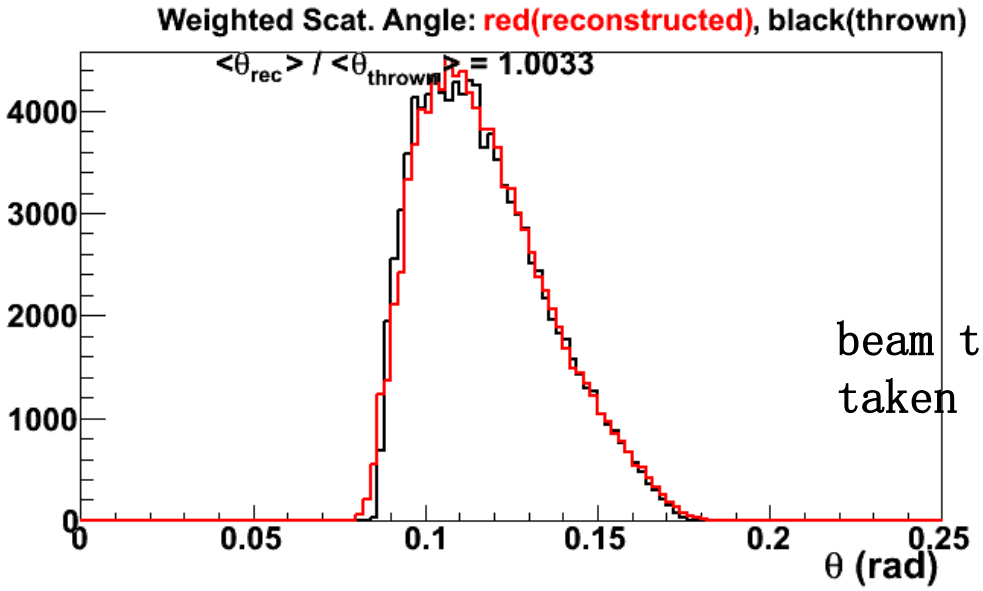
Introduction

- Reconstructed to the target plane for a 28mm target with target field will not provide event by event accuracy in scattering angle
- But the central value of the scattered angle and cross section might not deviate too much from what they should be. This work is trying to find out how large the difference can be.

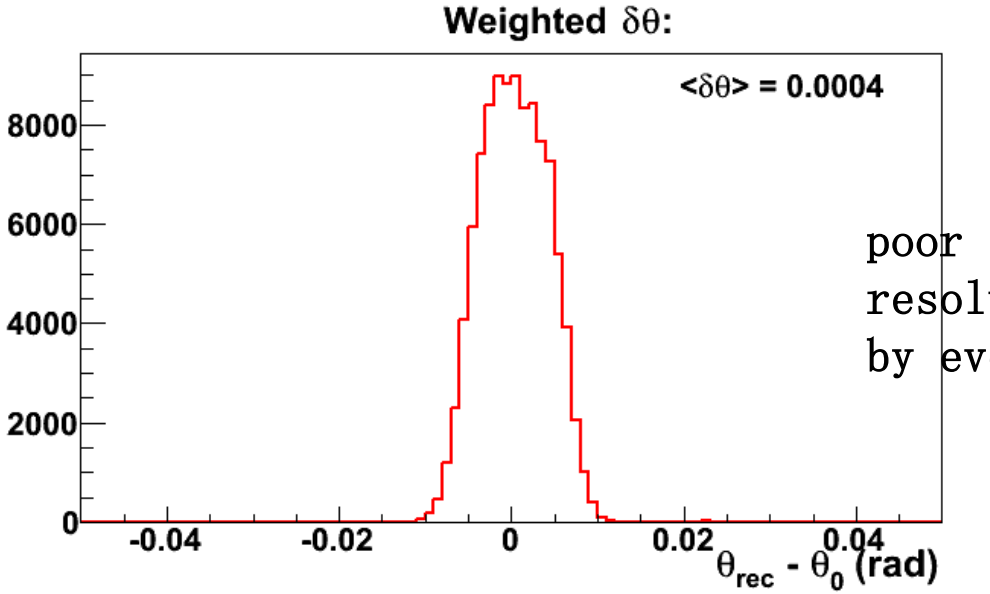
Details of this work

1. 28mm target length,
2. E=2.254 GeV.
3. Tried only 5.0T target field, beam tilted angle at target center is 0. (Hit the local dump.)
4. Tried P0=2.251, 1.500 and all (0.5-2.251)
5. Inelas XS from qfs. Elas Carbon XS from K. C. Stansfield et al. PRC 3, 1448 (1971)
6. Throw position and angle in flat distribution. Weight event by event with XS during ploting the histogram.
7. HRS hits were reconstructed only to the target plane. Beam tilted angle has already been taken into account when calculating the scattering angle.

Scattering Angle, P0=2.251

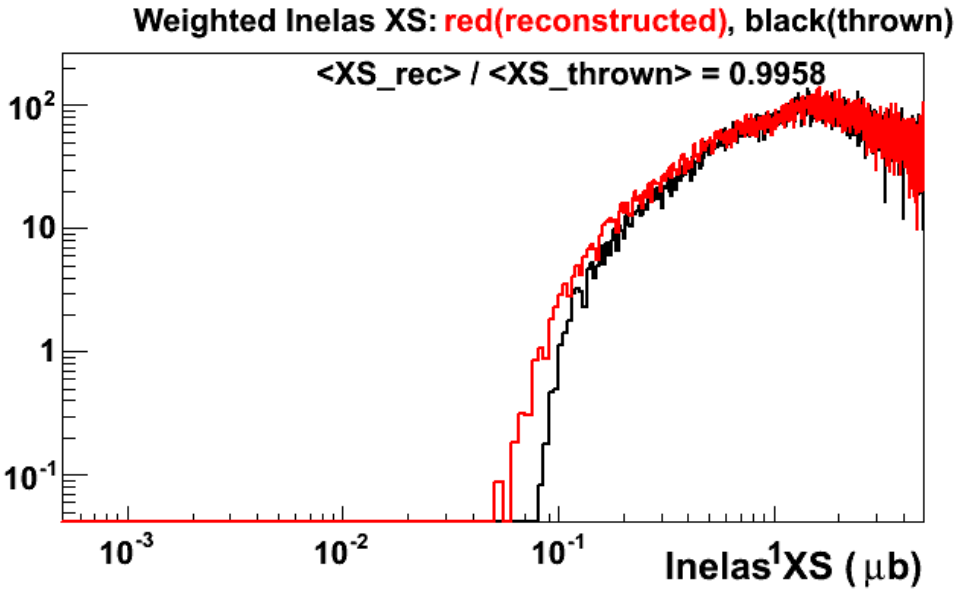


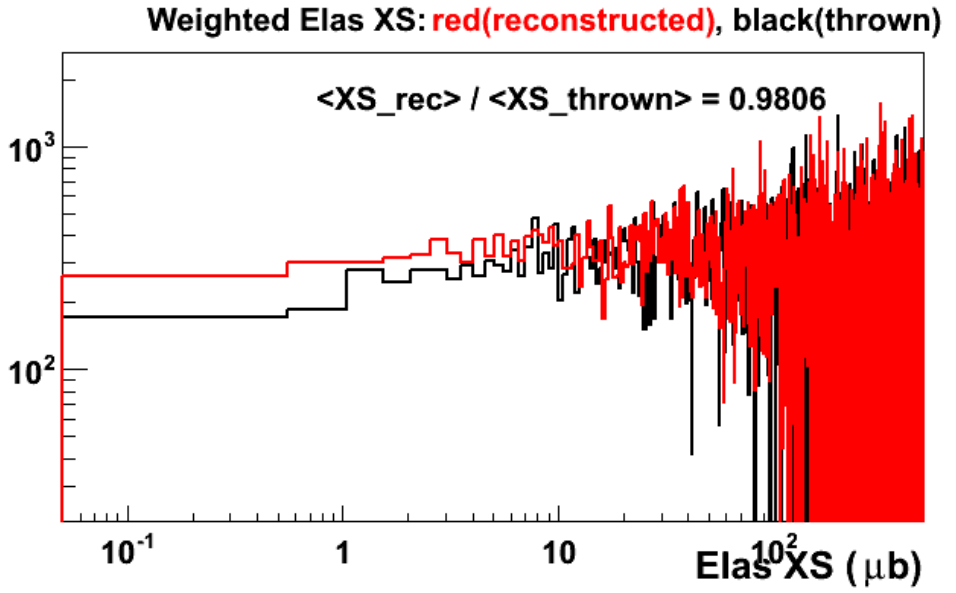
beam tilted angle was taken into account



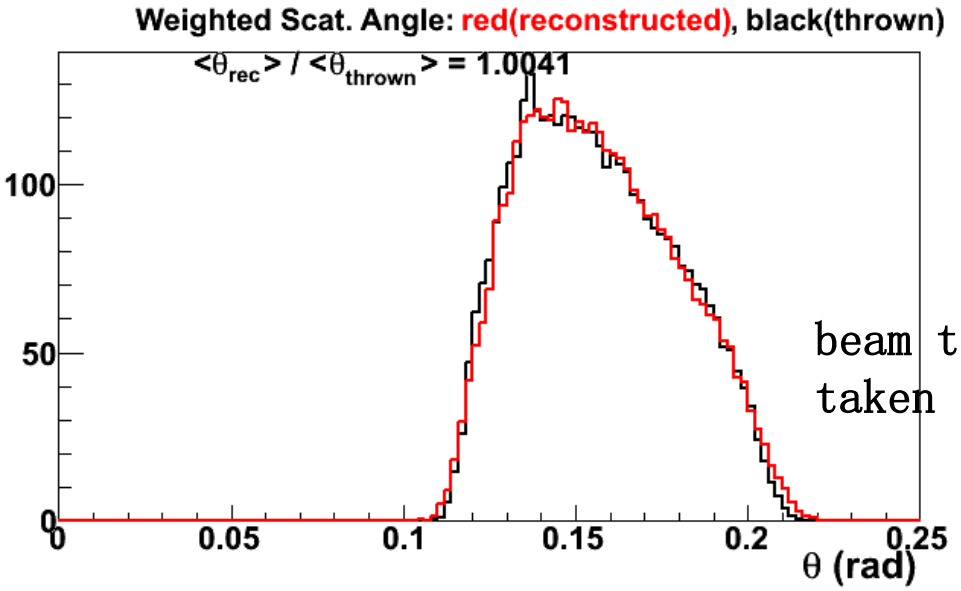
poor theta resolution event by event

XS Central Value, P0=2.251

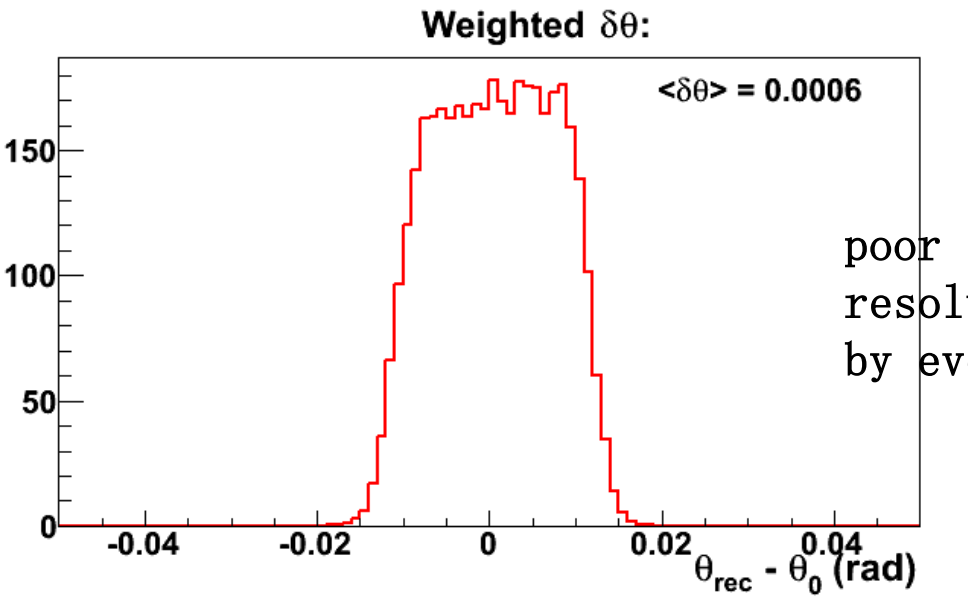




Scattering Angle, P0=1.500

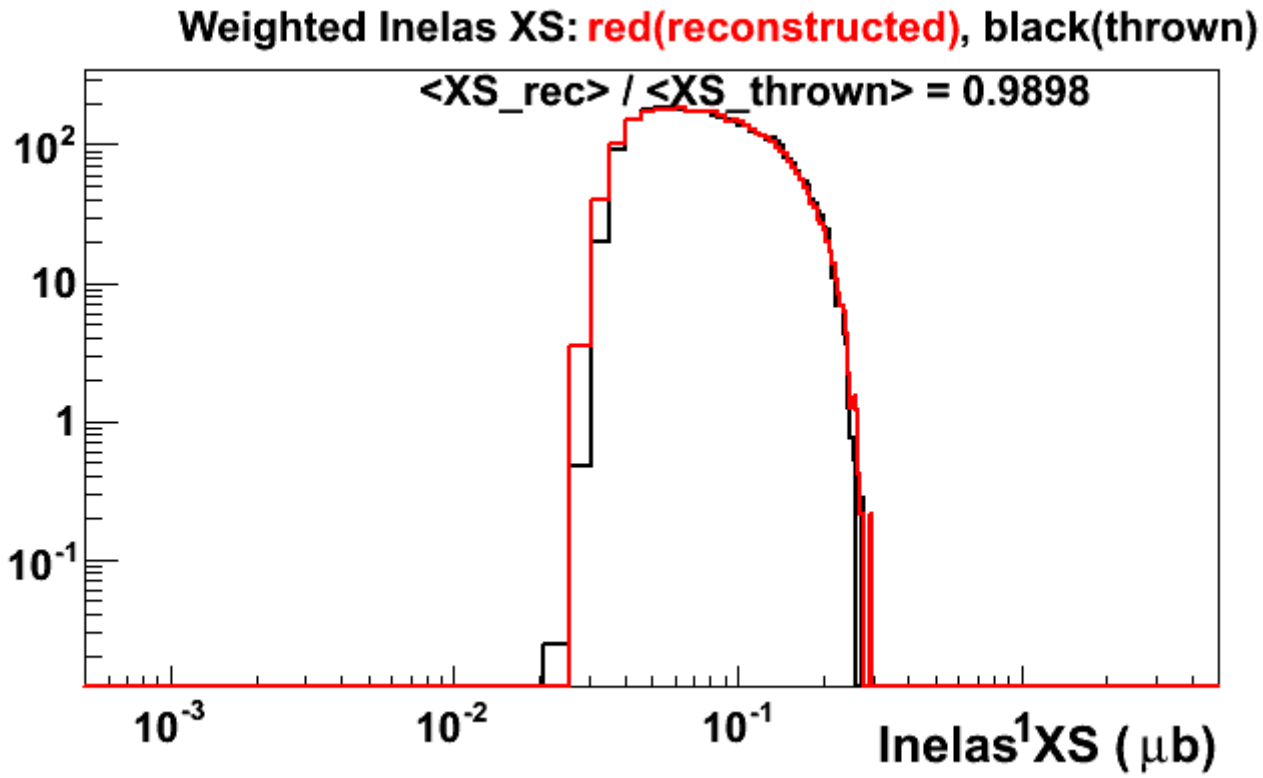


beam tilted angle was taken into account

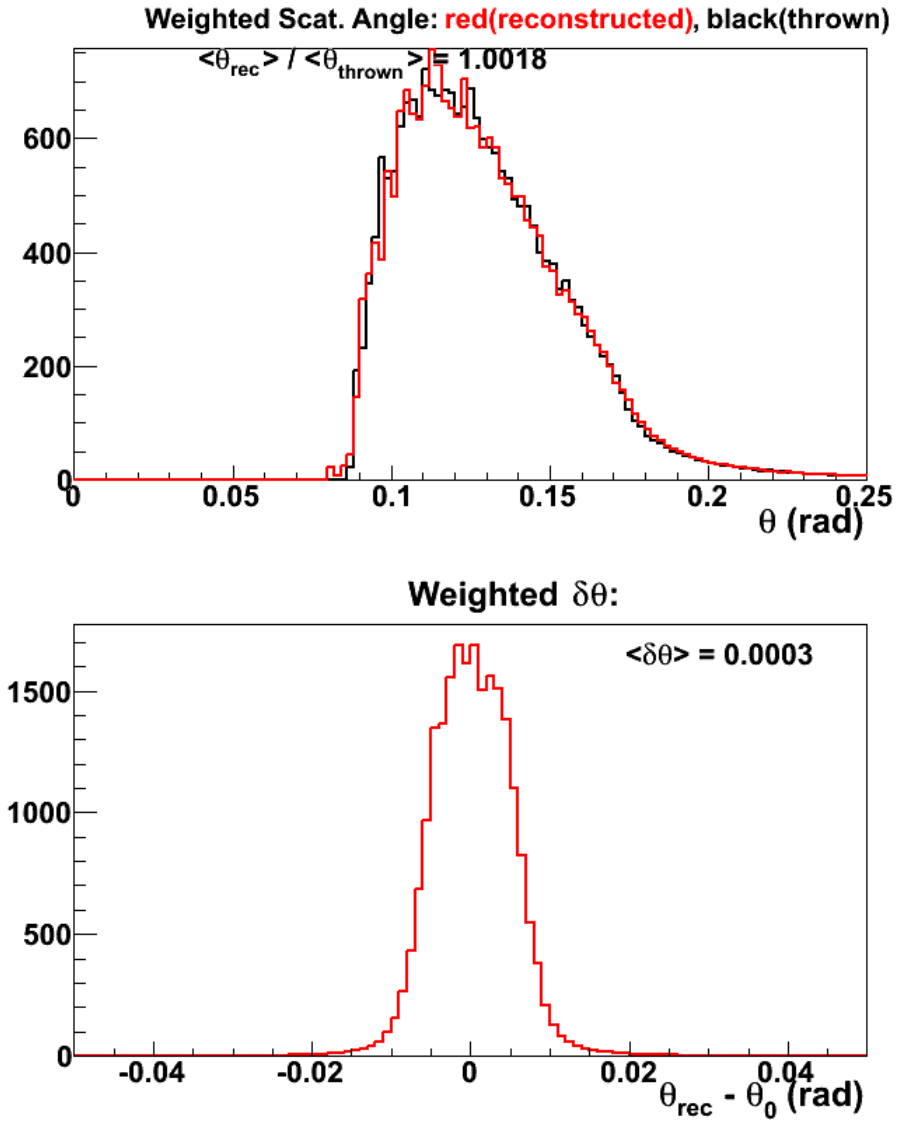


poor theta resolution event by event

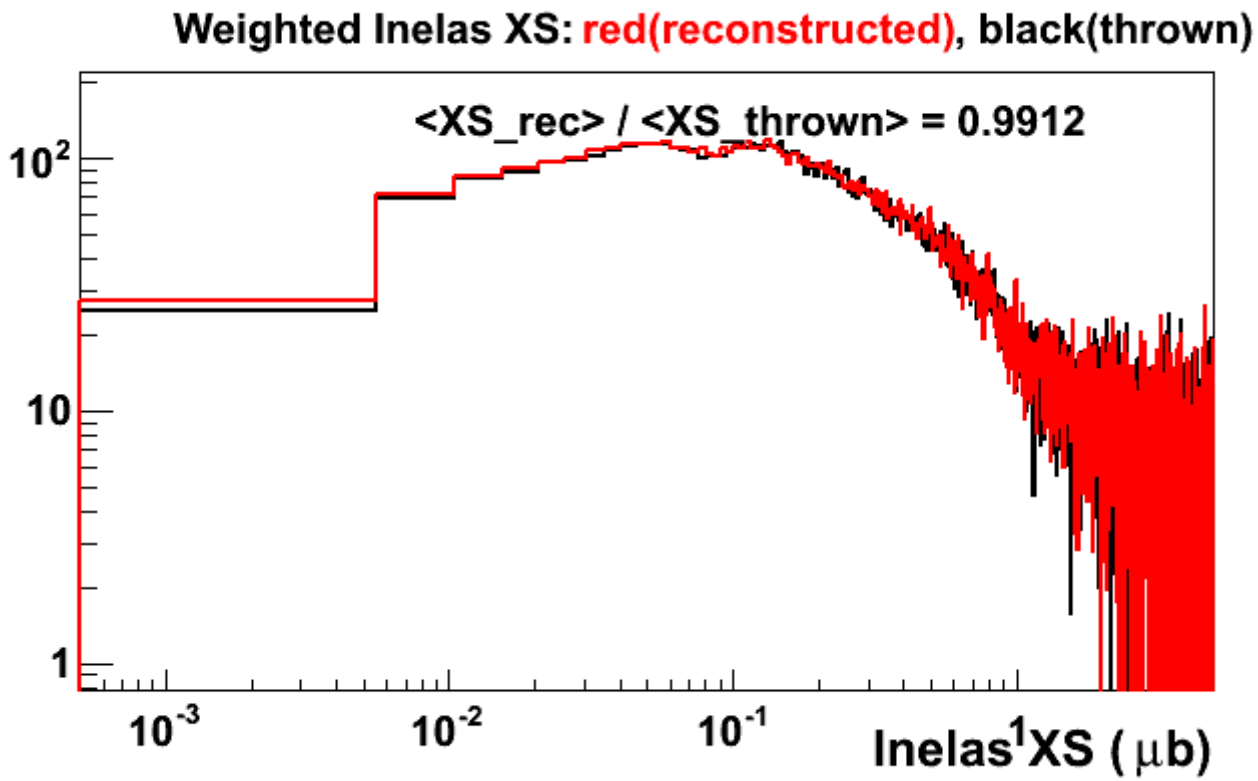
XS Central Value, P0=1.500



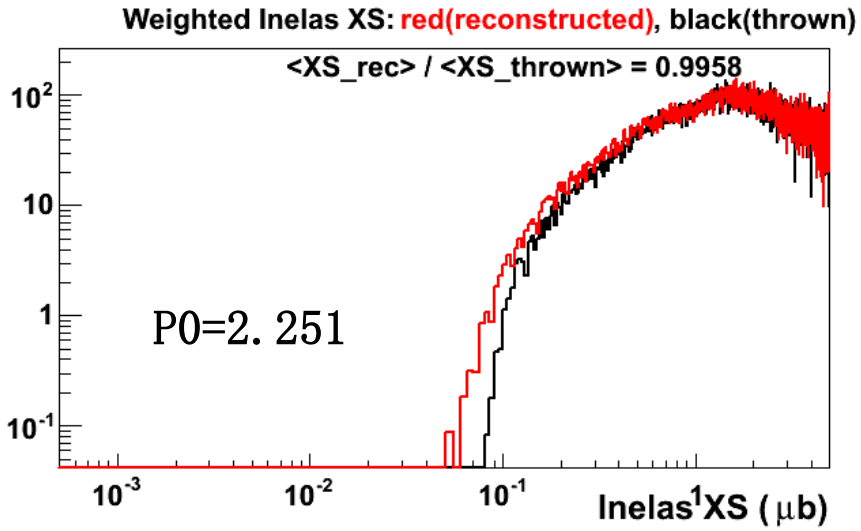
Scattering Angle, 0.5<P0<2.251

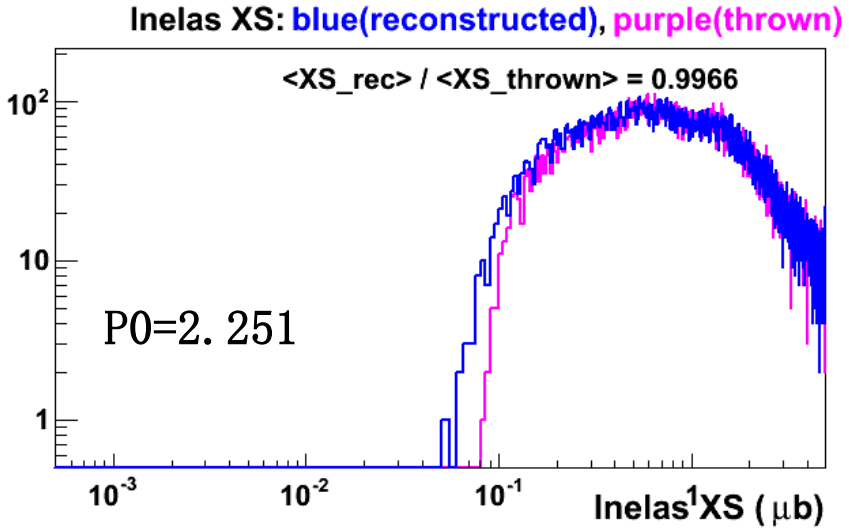


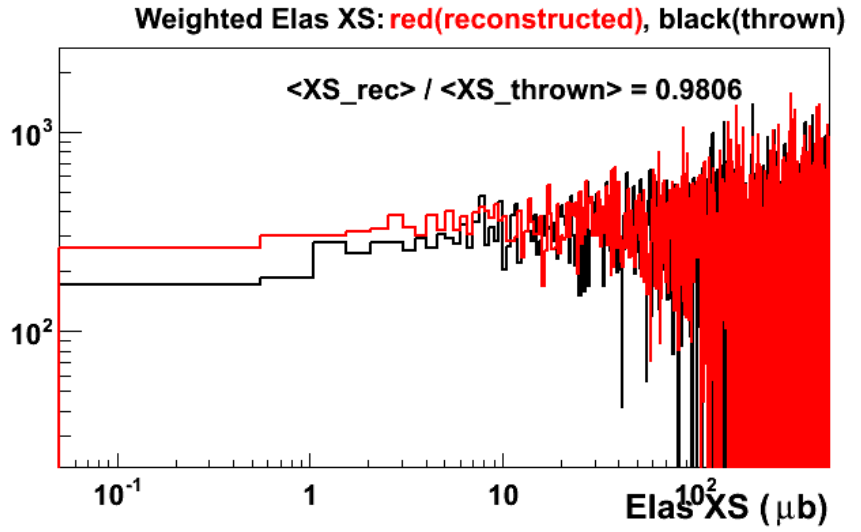
XS Central Value, 0.5<P0<2.251

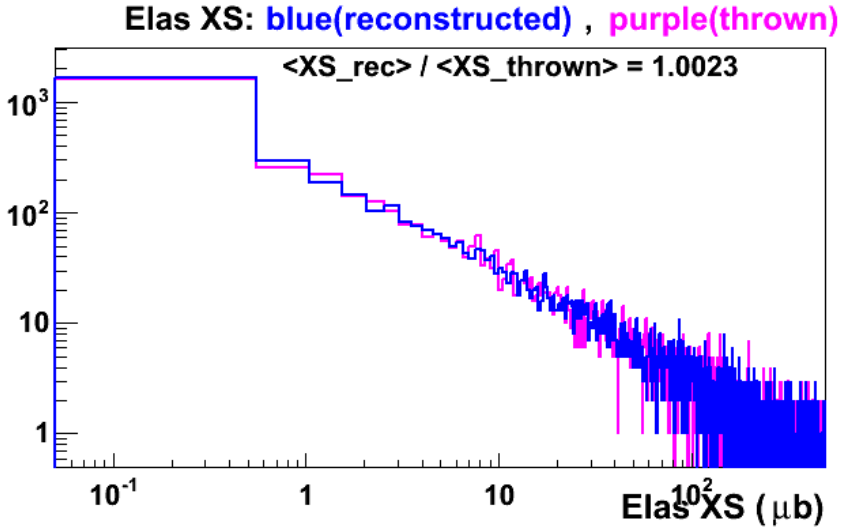


XS Systematic Error of Using QFS Model @ P0=2.251

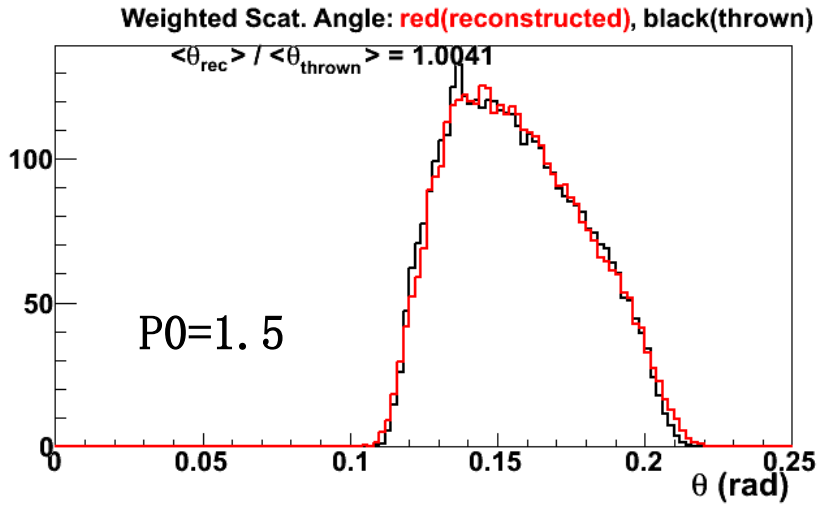


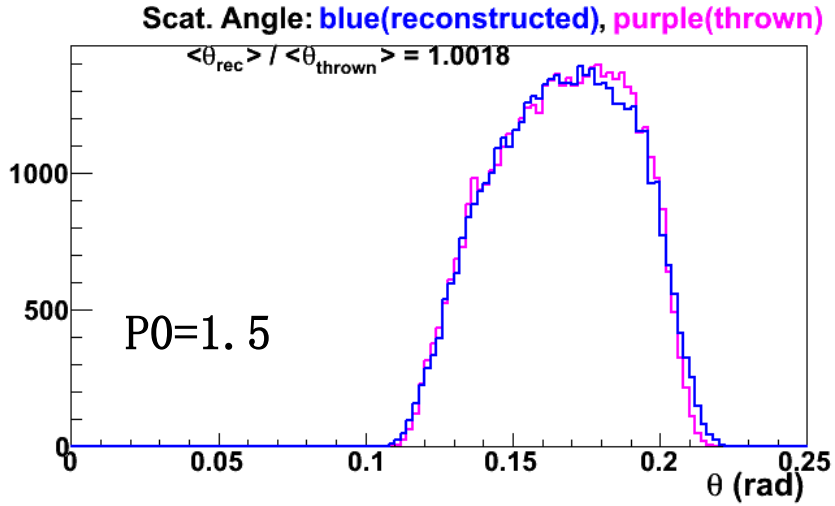


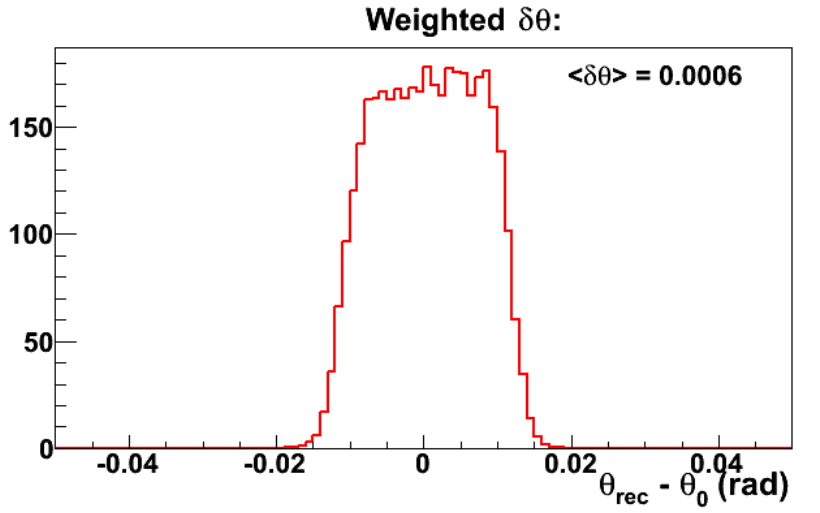


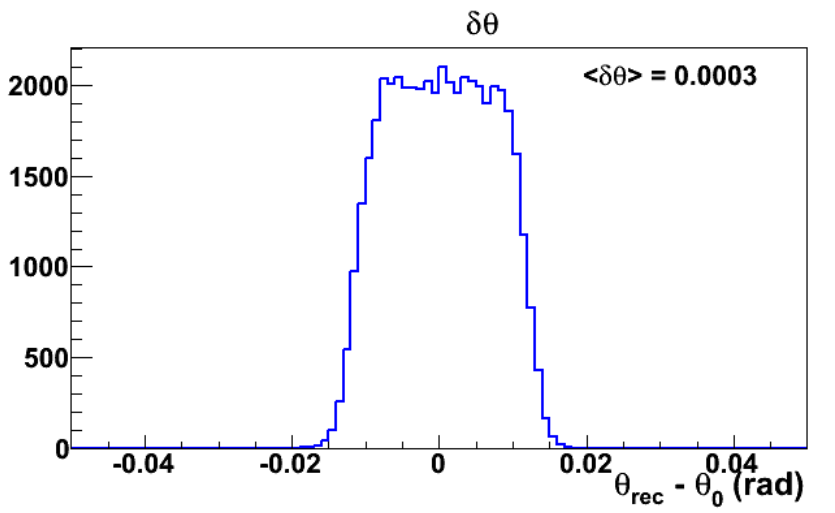


Angle Systematic Error @ P0=1.5

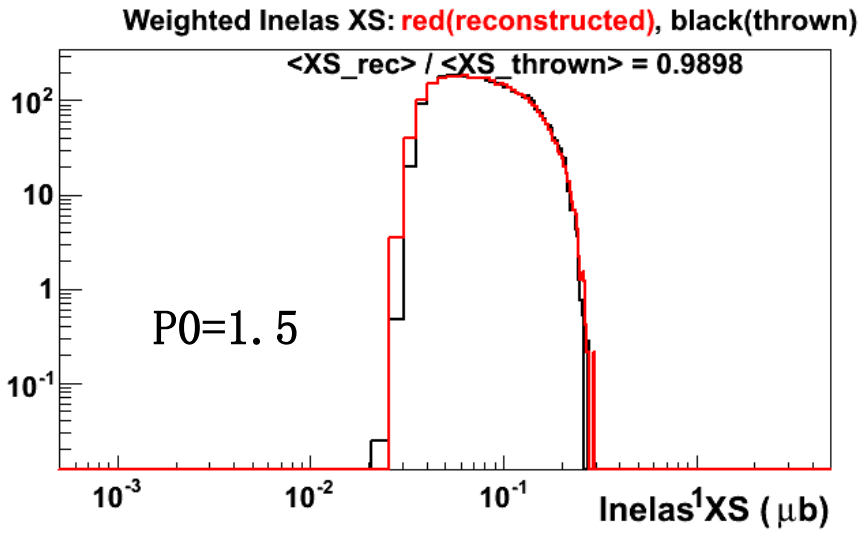


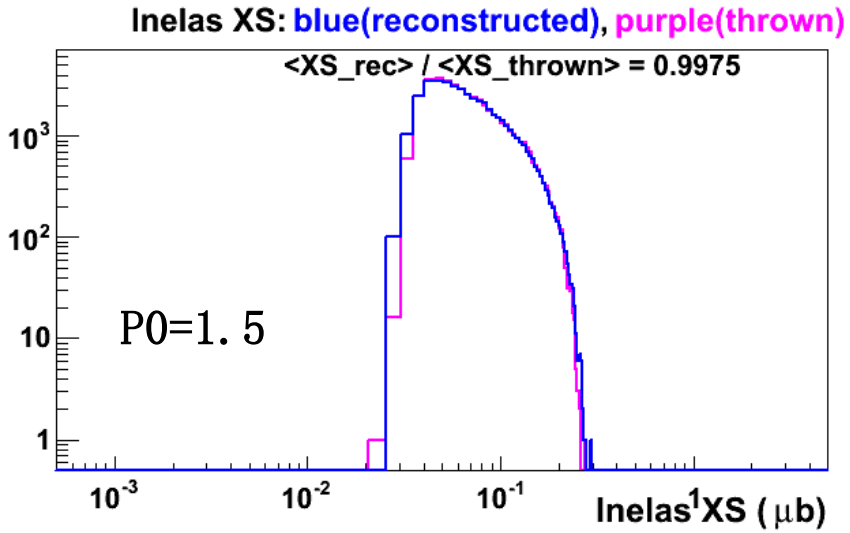






XS Systematic Error of Using QFS Model @ P0=1.5



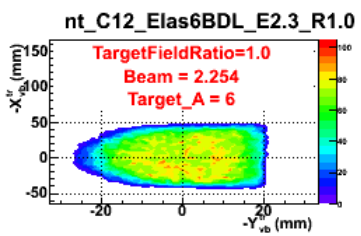


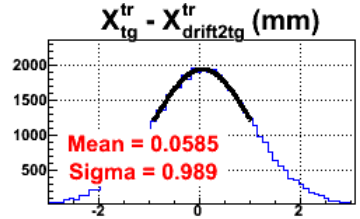
Conclusion

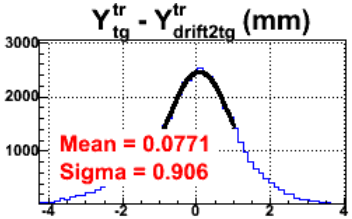
- Although there is no event by event resolution, the centeral value of the inelastic XS still can be determine up to about 1% level
- HRS is simulated by snake models. In other workds, there is no bias or offsets issues in the reconstruction.
- QFS is not a perfect XS model to use. But replace XS model with a better one will not change this conclusion. The systematic error of various XS model will be about 1%.

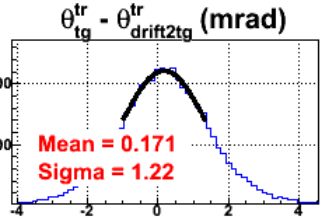
Back up

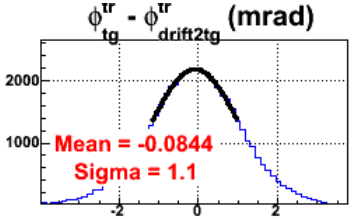
28mm Target, E=2.254, P0=2.251

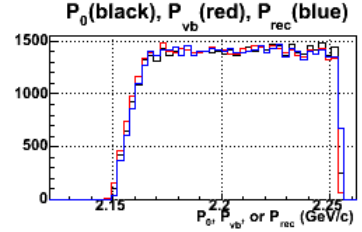


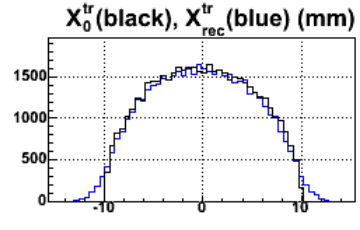


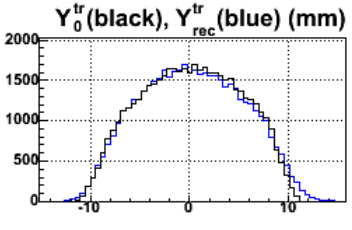


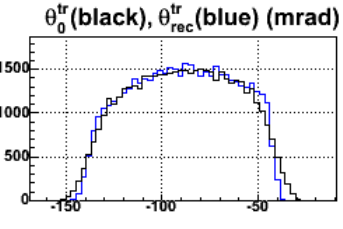


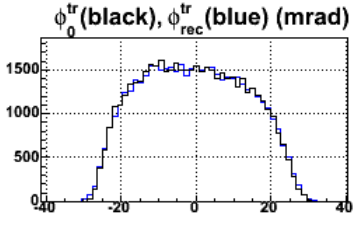


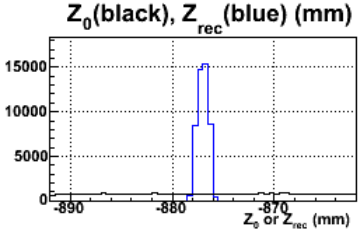


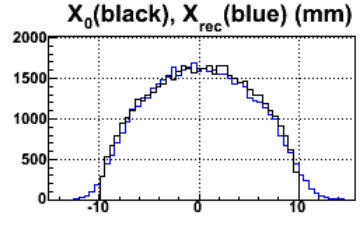


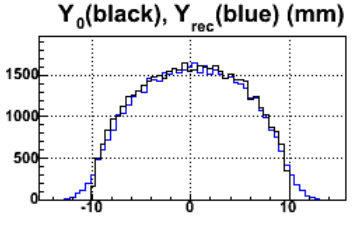


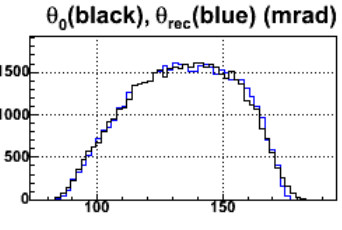


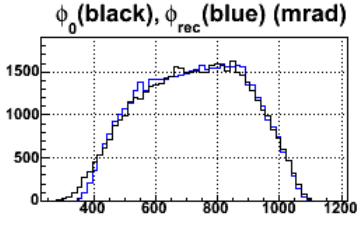


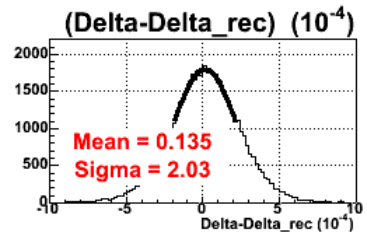


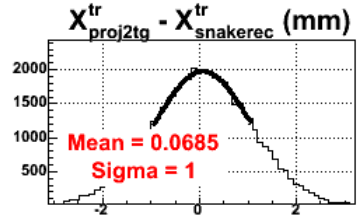


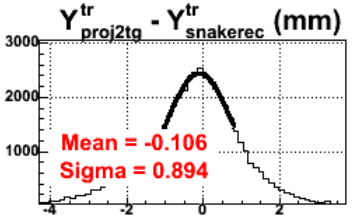


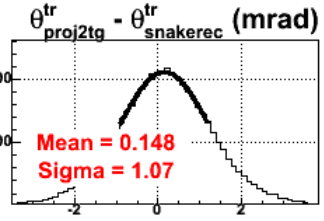


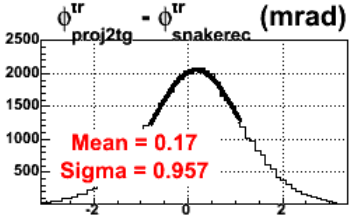


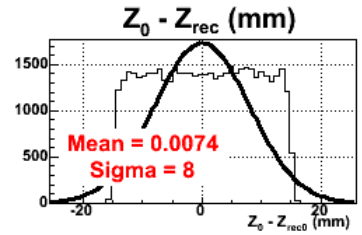


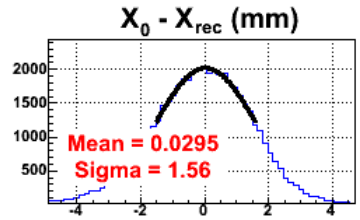


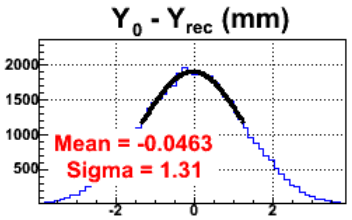


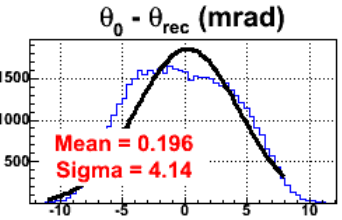


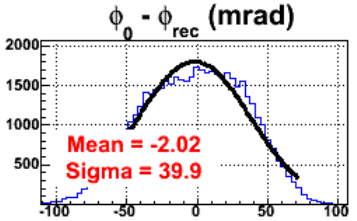




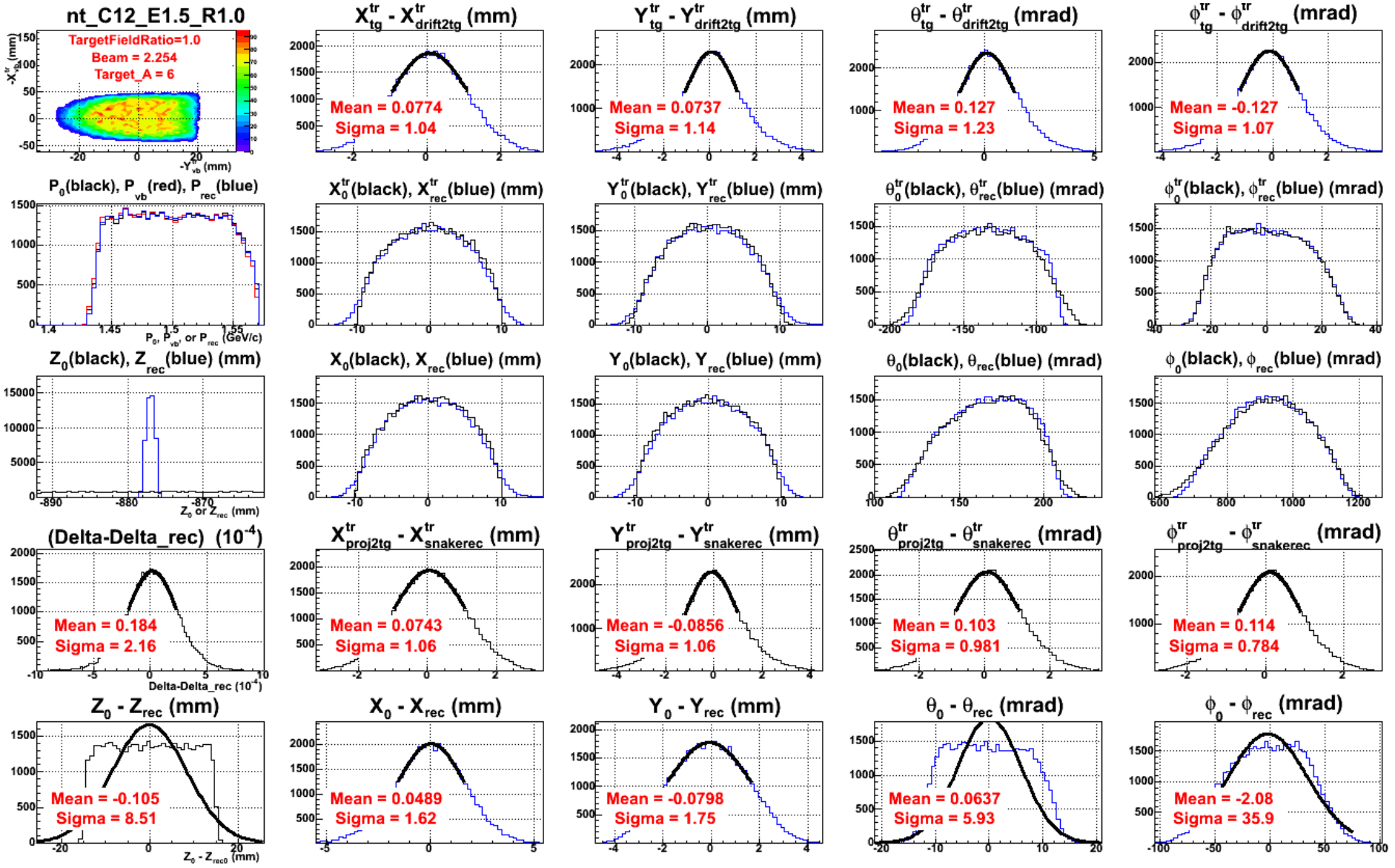








28mm Target, E=2.254, P0=1.500



28mm Target, E=2.254, 0.5<P0<2.251