Optics Status Update

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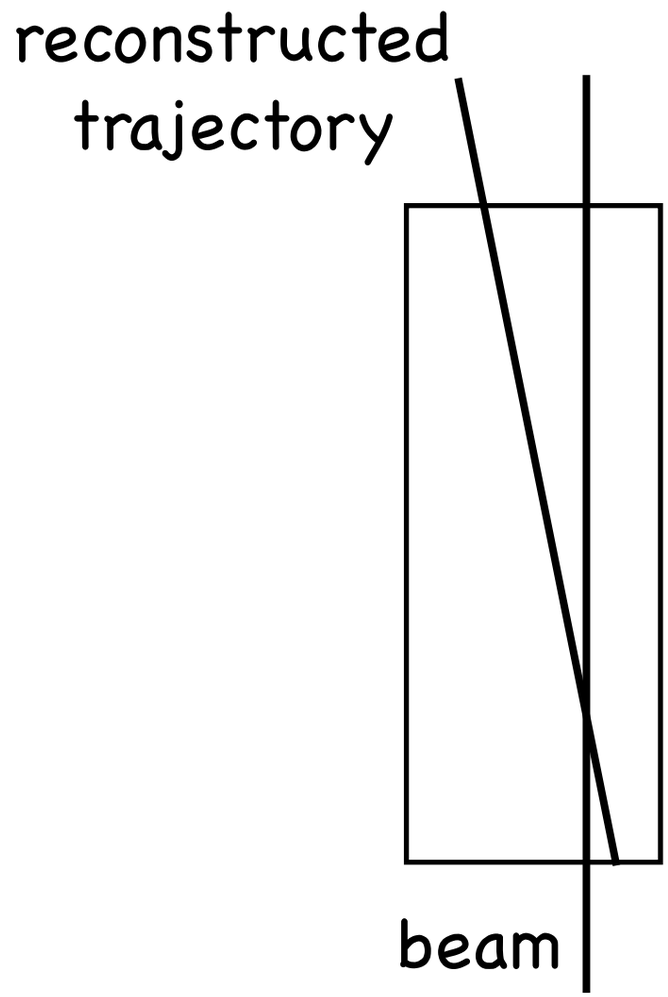
Simulation

- Add drifting in the target field function into the TestSNAKE package
    - Optimized algorithm, ~40% faster
- Test a new reconstruct method using this package

Reconstruct

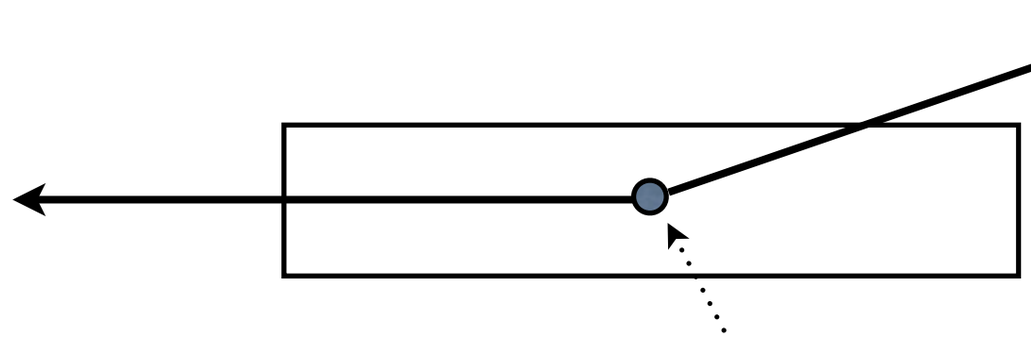
- With the information from 2 BPMs we could define the trajectory of beam
- With the focus plane variables and the database we could define the trajectory of the scatted electron
- The intersection of these 2 trajectory should be the reaction point
- If we calculate these trajectories with the information we have, they will not actually intersect because of the detector resolution
  - Just take the closest point



Simulation

use SNAKE model
to calculate focus
plane variables

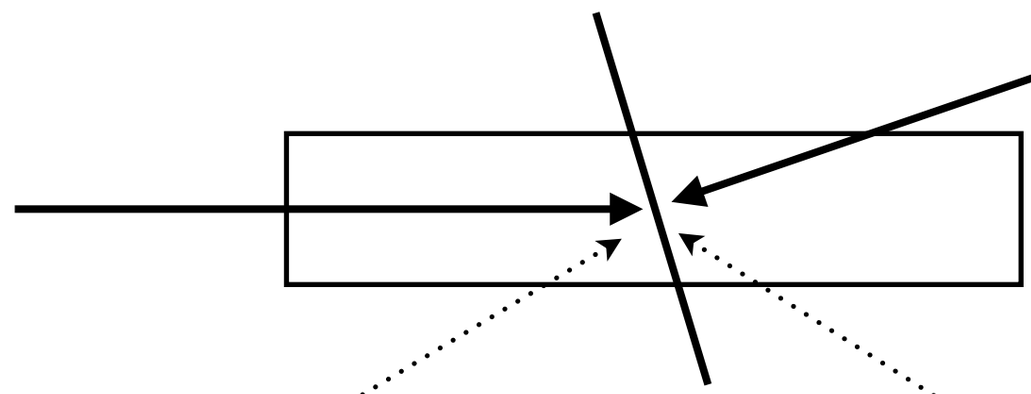
calculate
coordinates at
BPM location



real reaction point
generate kinematics for both incoming
and outgoing particles at here

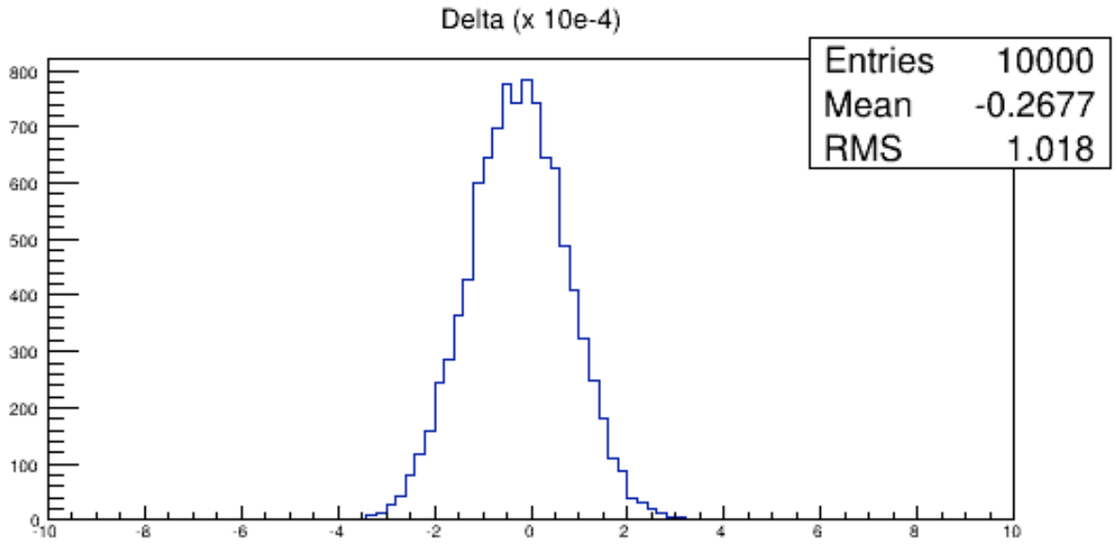
focus plane
variable

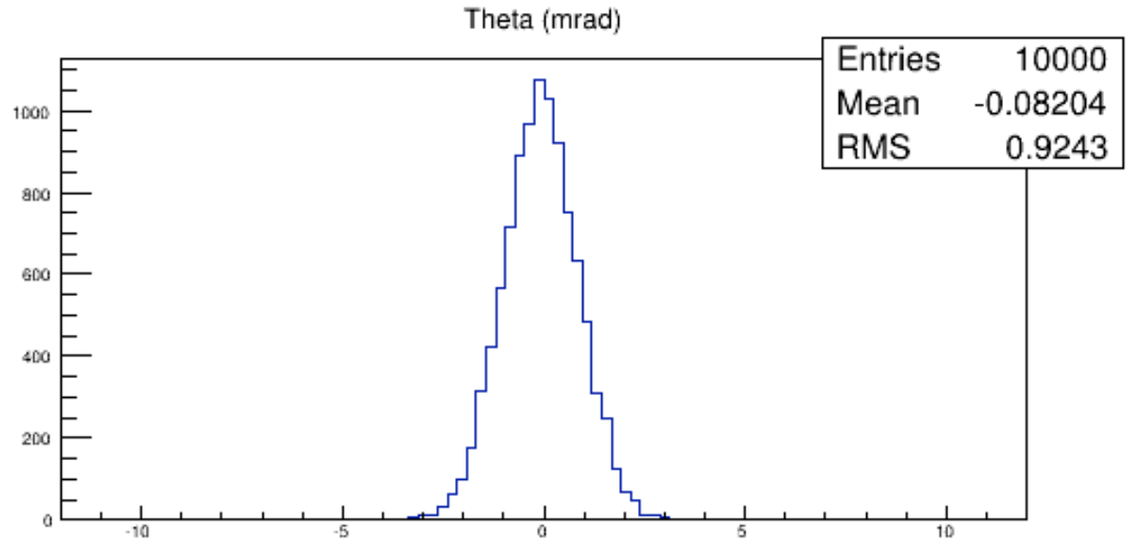
put BPM
resolution into
consider

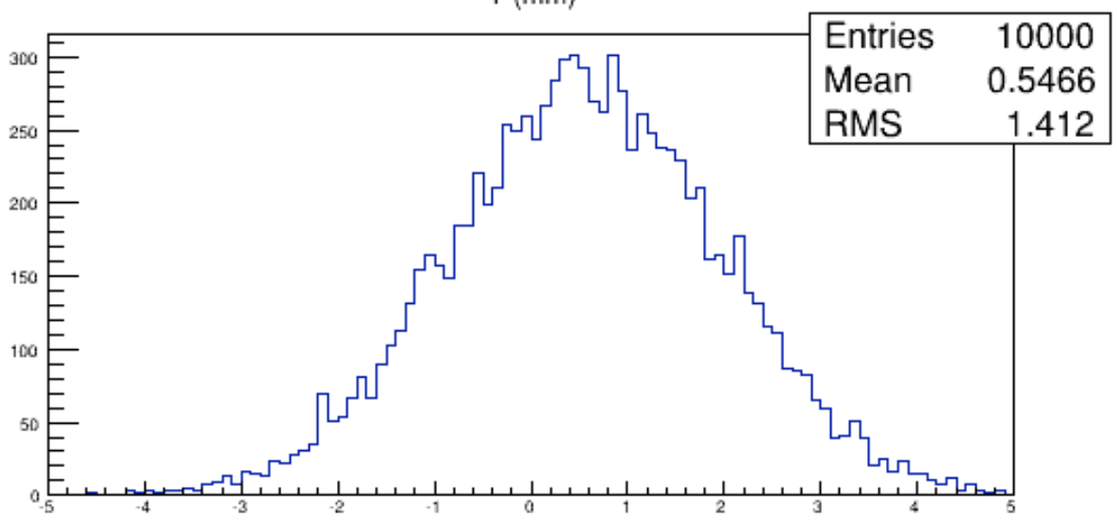


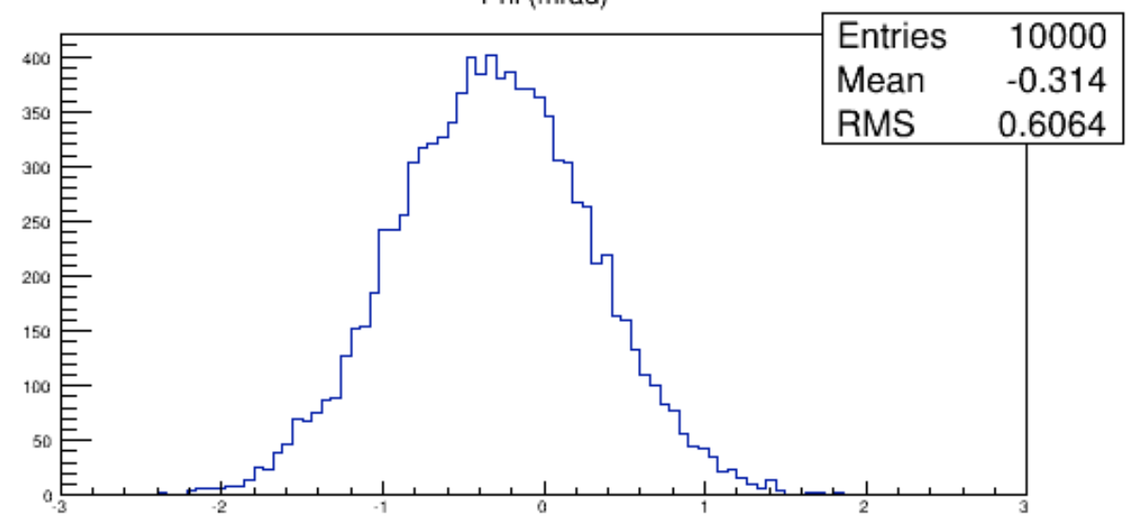
use the same way as
Pengjia did to get the
beam info at target plane

use SNAKE model to
reconstruct target
plane variables

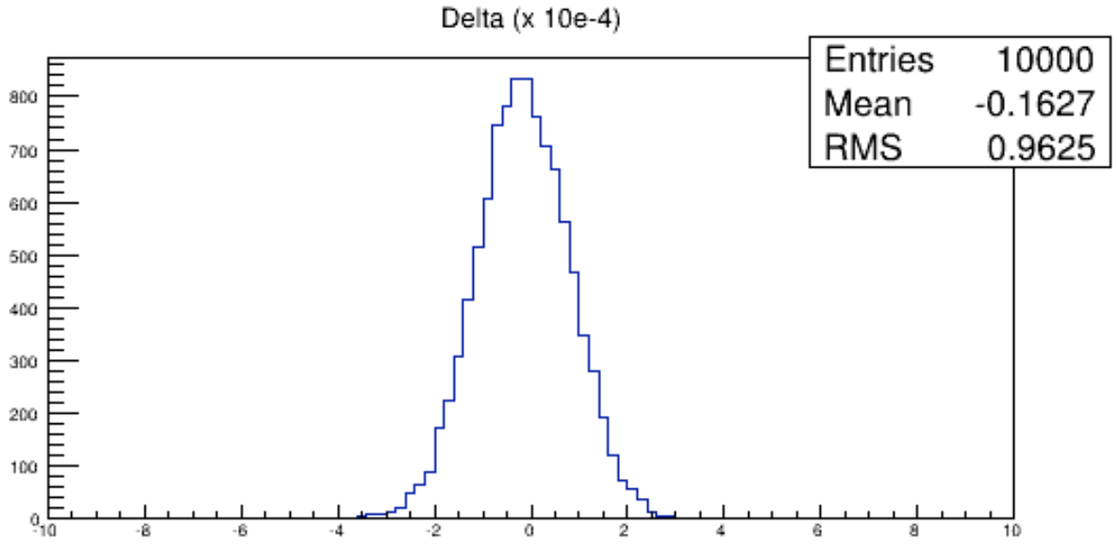


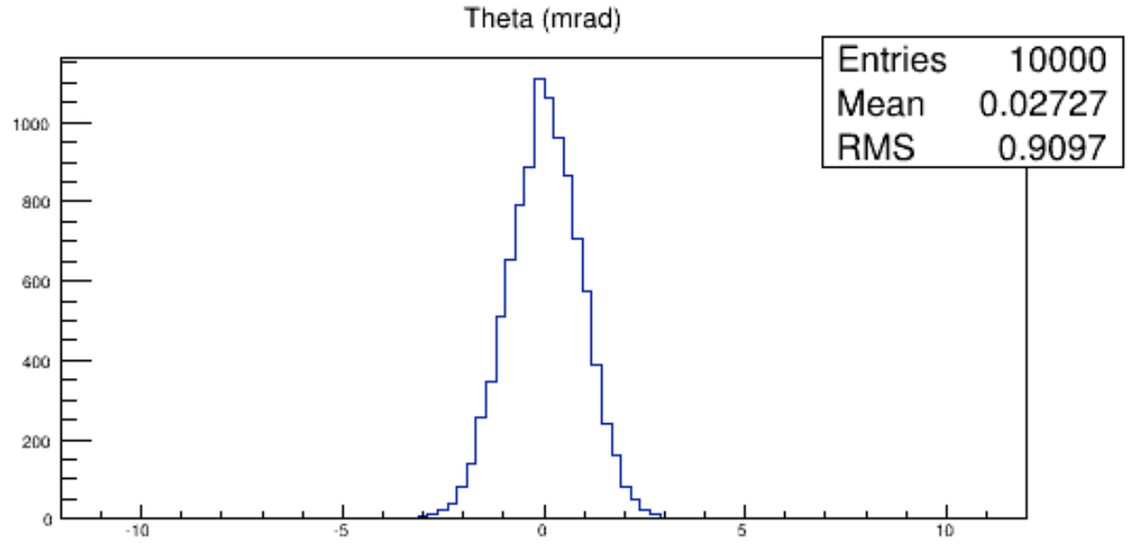


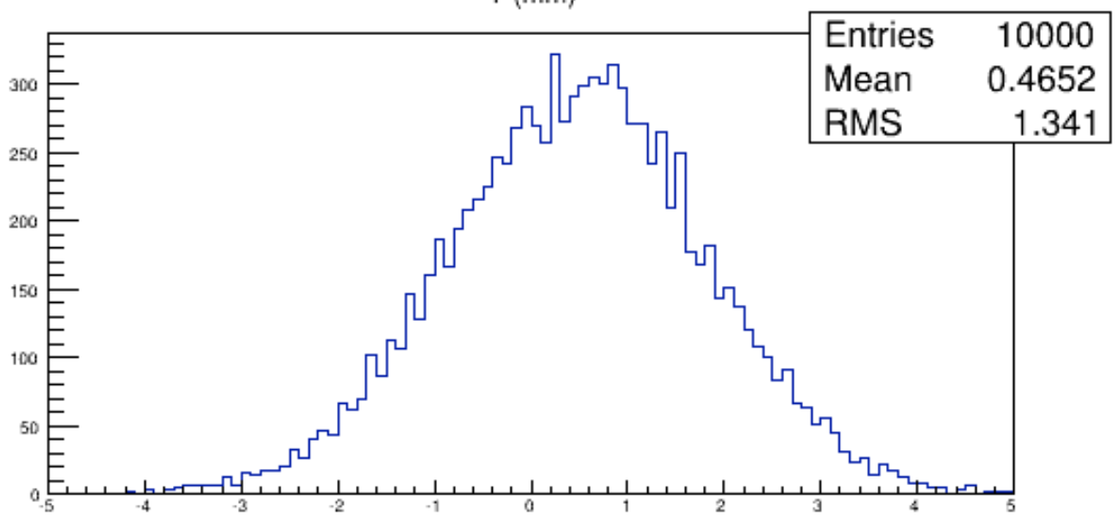


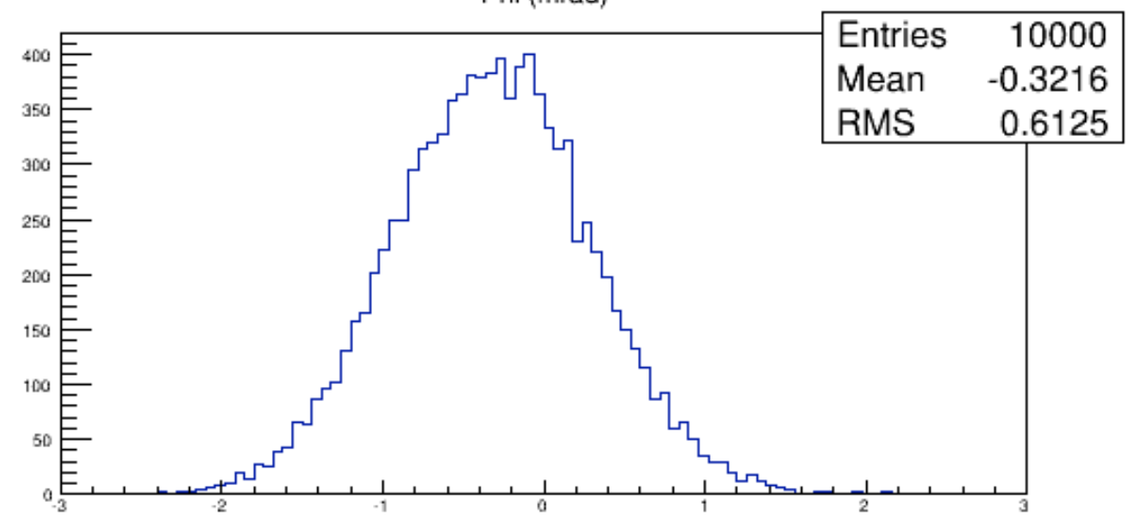


Reconstructed target variable uncertainty
(no target field)

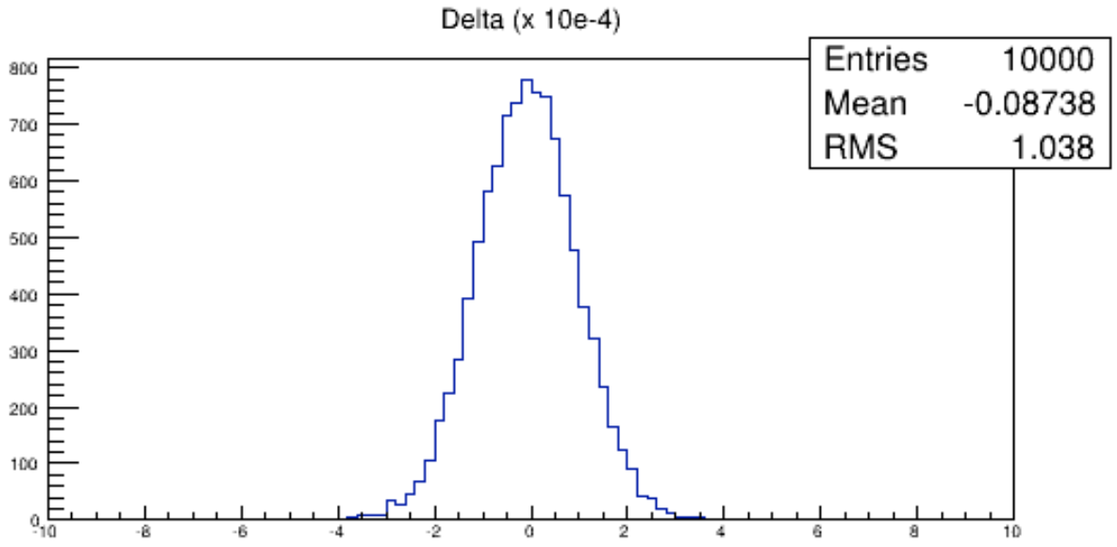


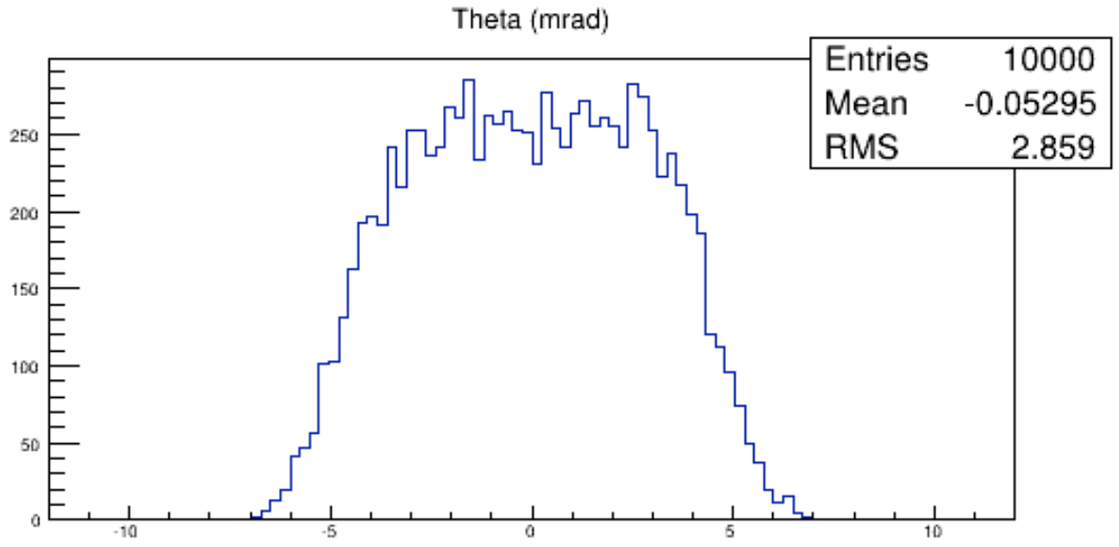


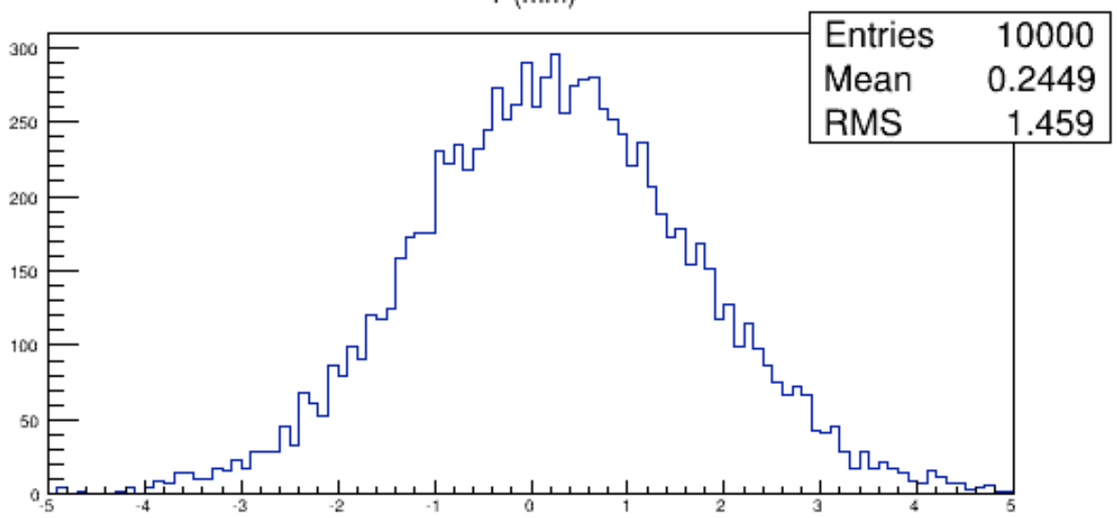


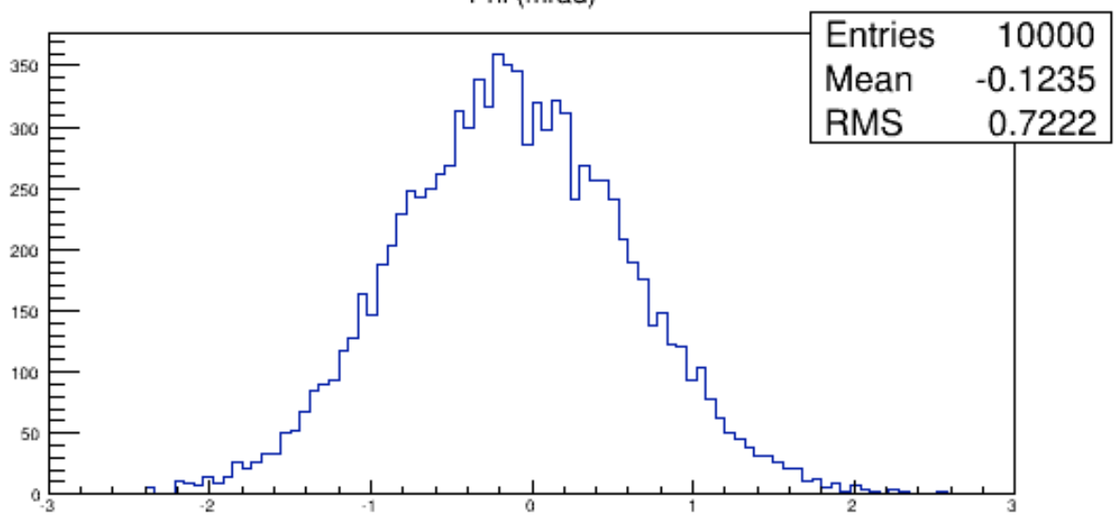


Reconstructed target variable uncertainty
(5T target field, assume 40mil foil target)



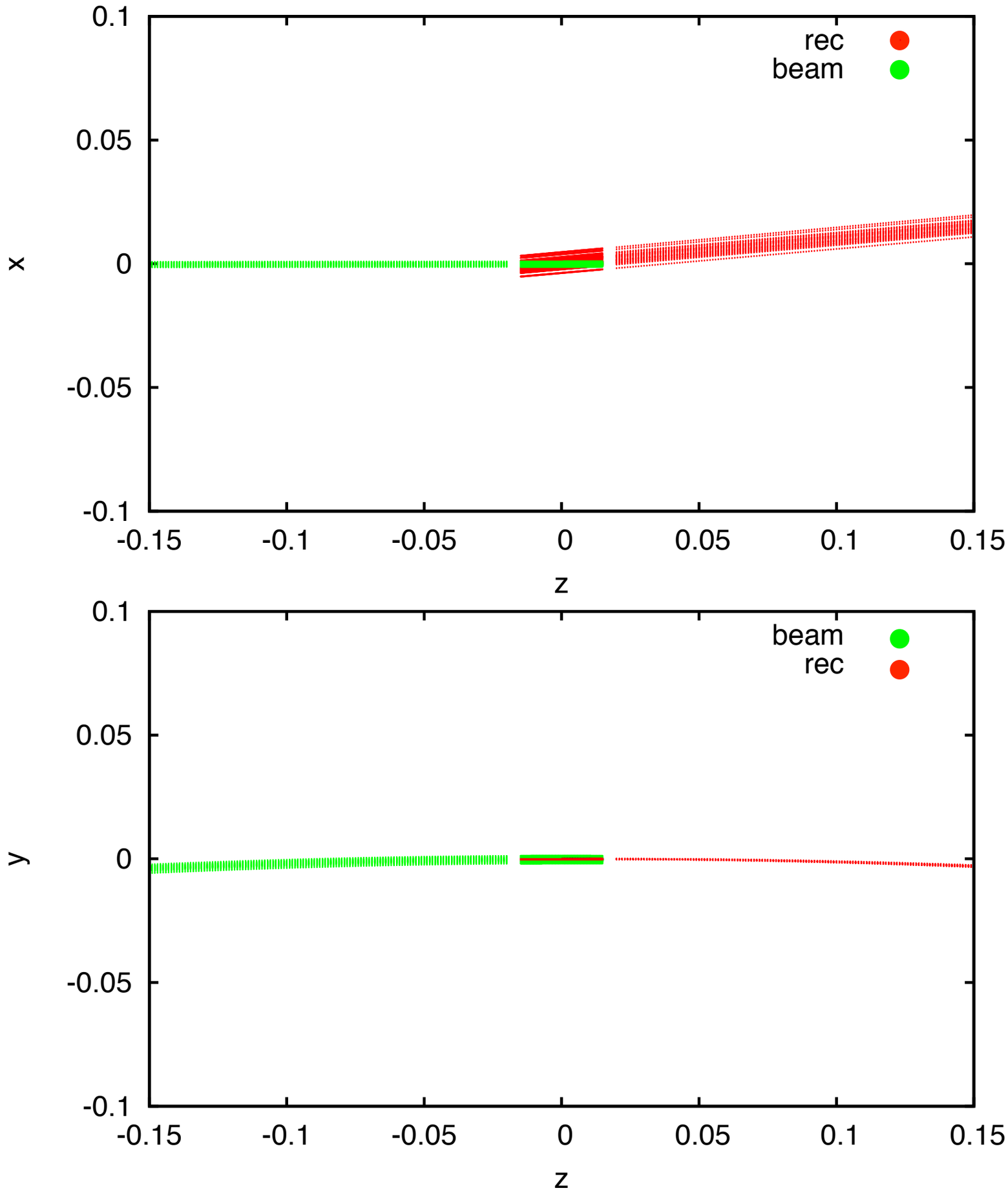


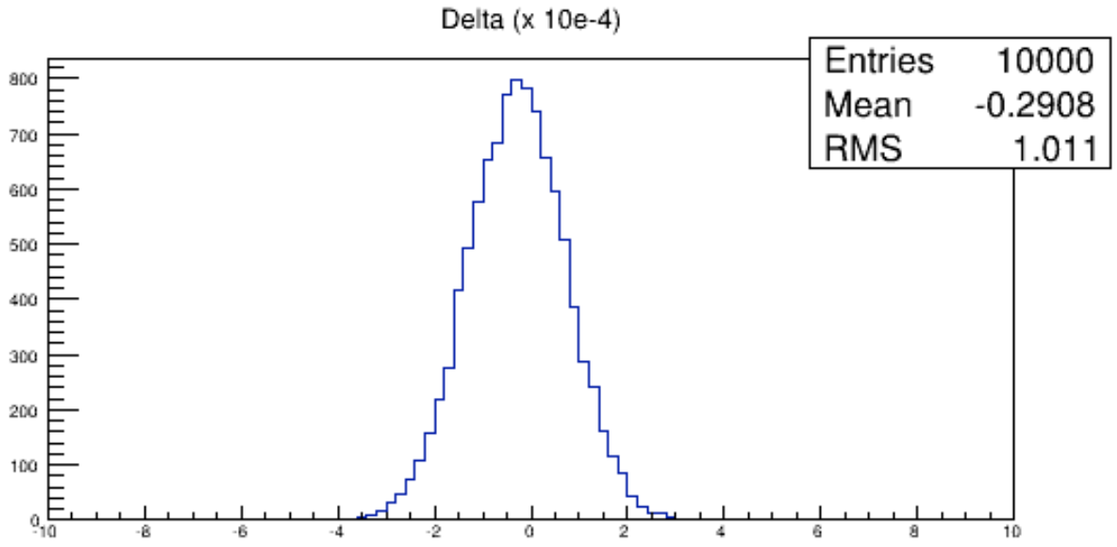


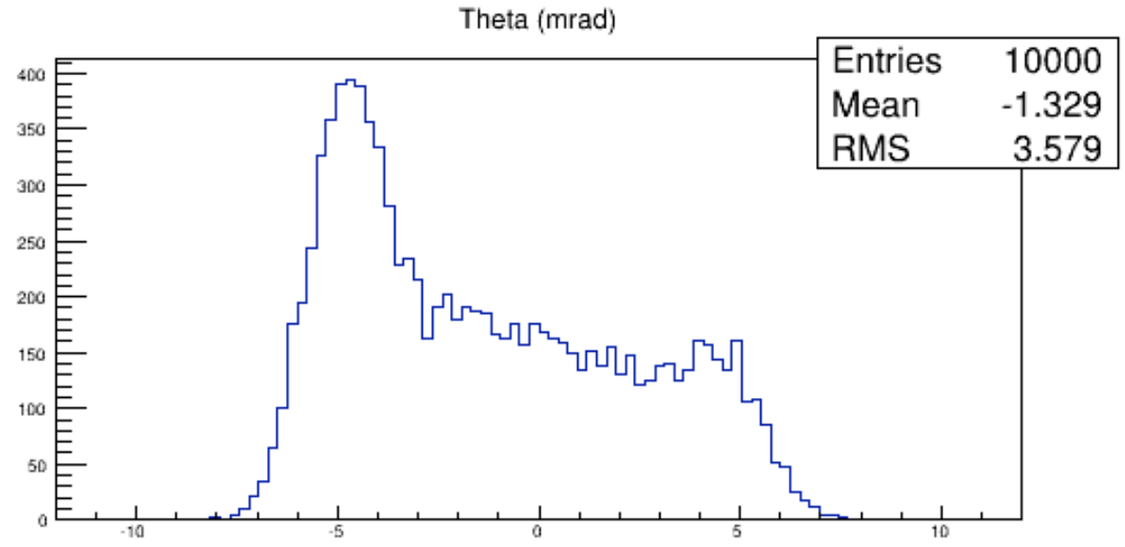


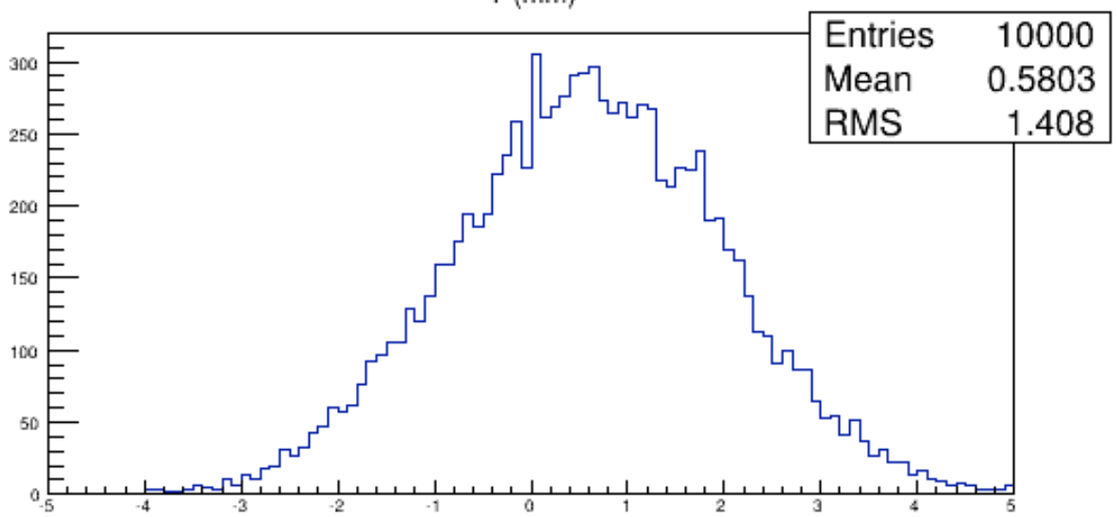
Reconstructed target variable uncertainty
(2.5T target field, 3cm target)

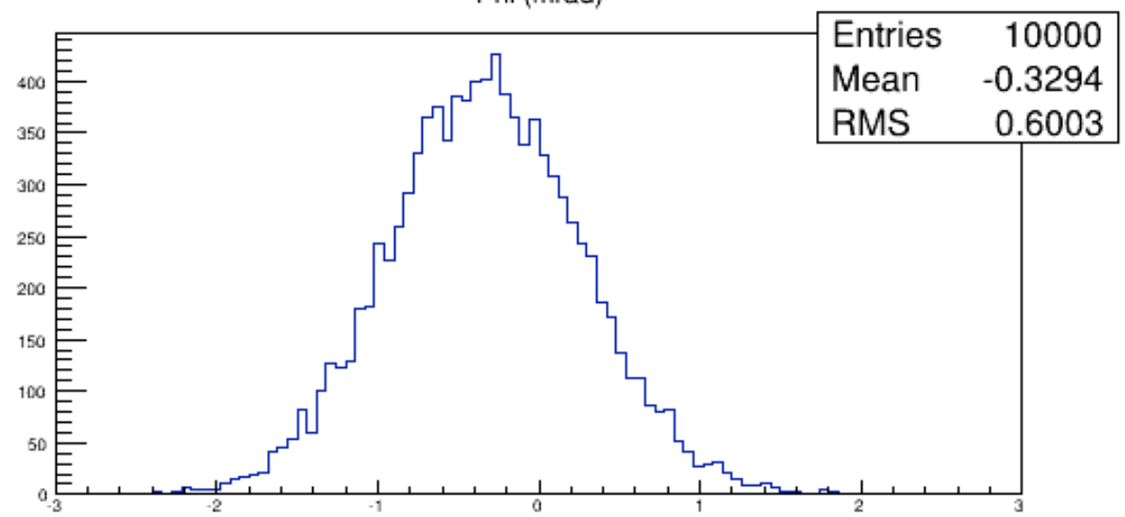
- Notice these plots are in hall coordinates (unit is meter)
- Use exactly the same reaction point and kinematics to generate 50 trajectories
- these trajectories are projected to Oxy and Oyz plane in hall coords, the width of each trajectory group actually suggests the resolution











Reconstructed target variable uncertainty
using the intersection method
(2.5T target field)

Summary

- Summary:
  - First try on elastic electrons suggests this method does not work
- TODO:
  - Check with low momentum
  - Move to the optics data at 484816 septa setting with target field to compare focus plane