
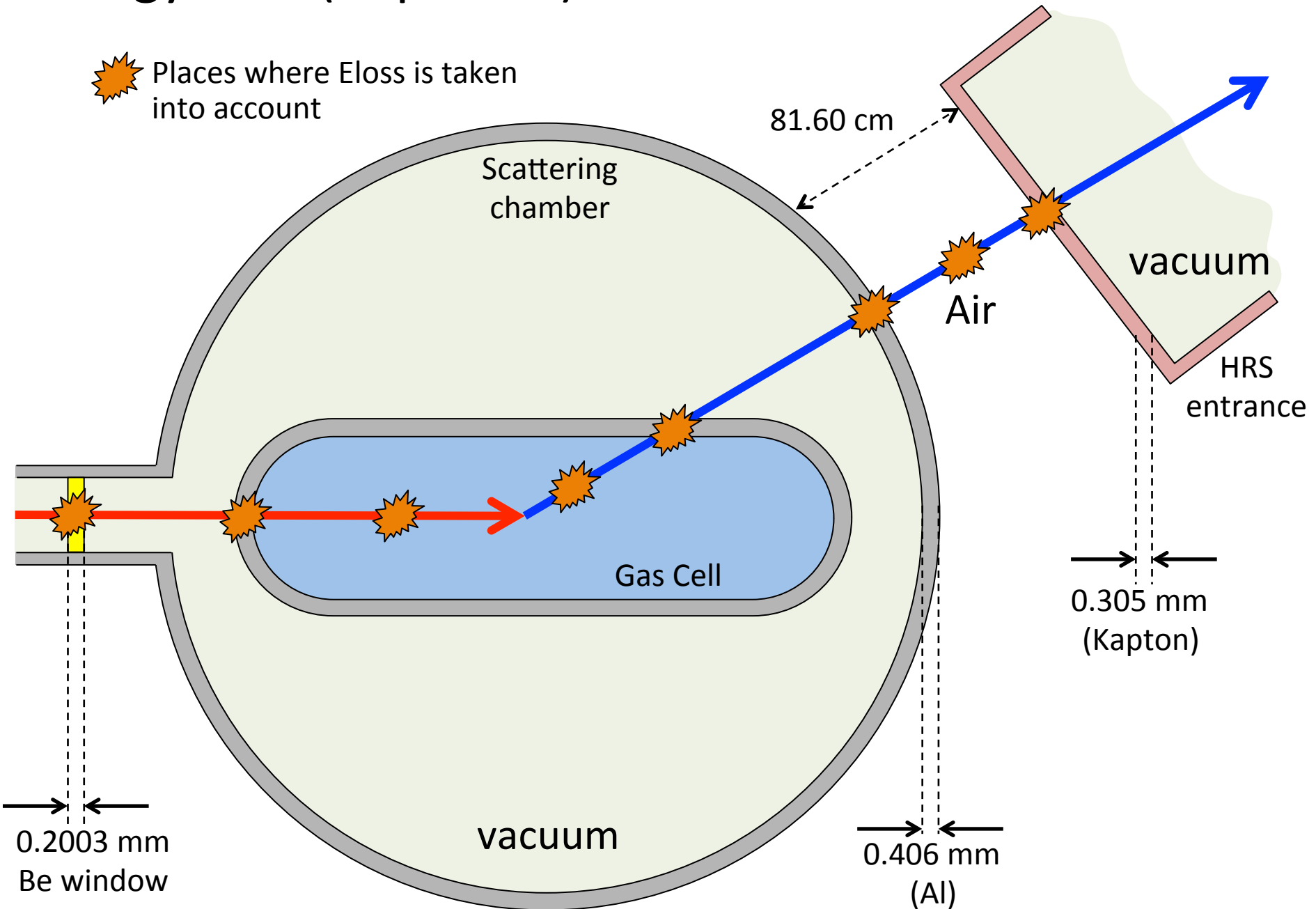


Update on: Energy loss corrections and variable offsets using hydrogen data

Reynier Cruz Torres
Tritium meeting
(June 12th, 2018)

Energy Loss (Top View)

 Places where Eloss is taken into account



Energy Loss

Class to determine beam Eloss

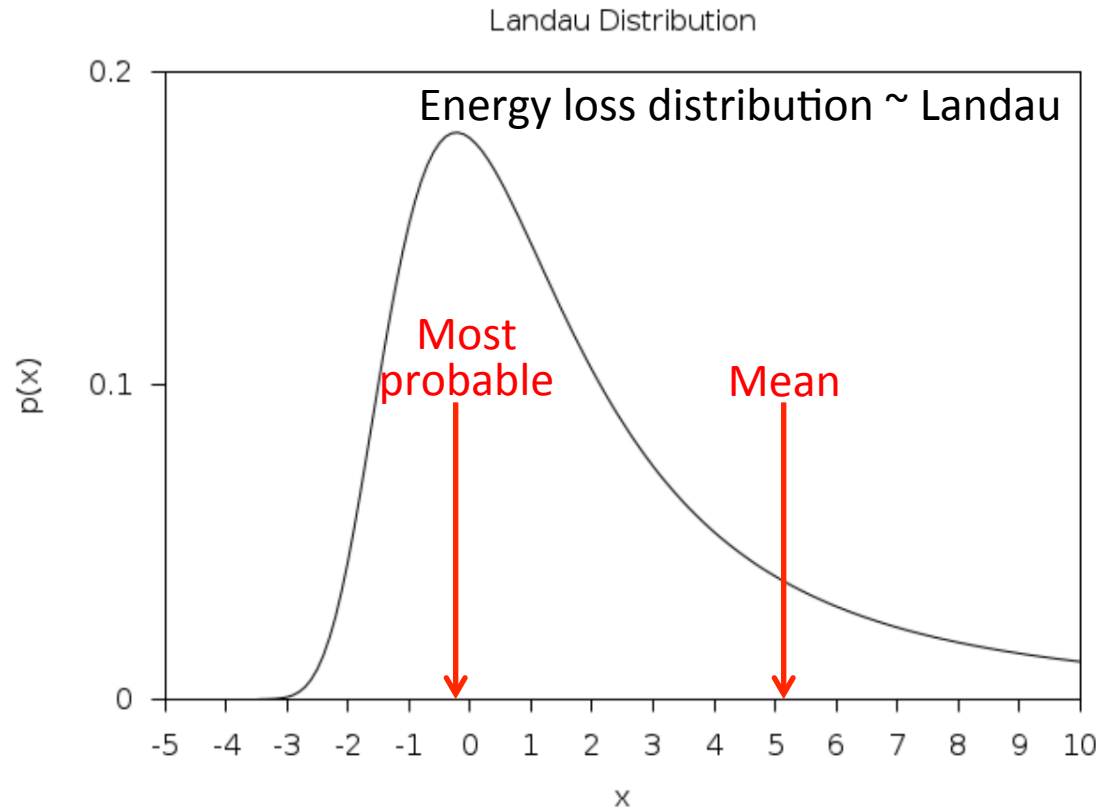
Calls

Class to determine scattered electron and proton Eloss

Calls

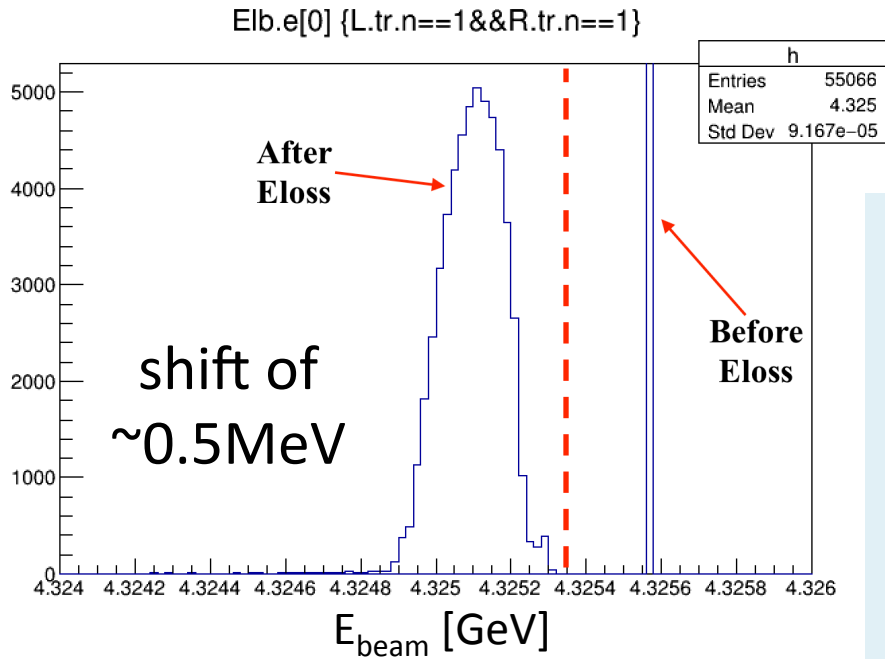
Class that does the actual Eloss calculation

* Uses mean Eloss equation



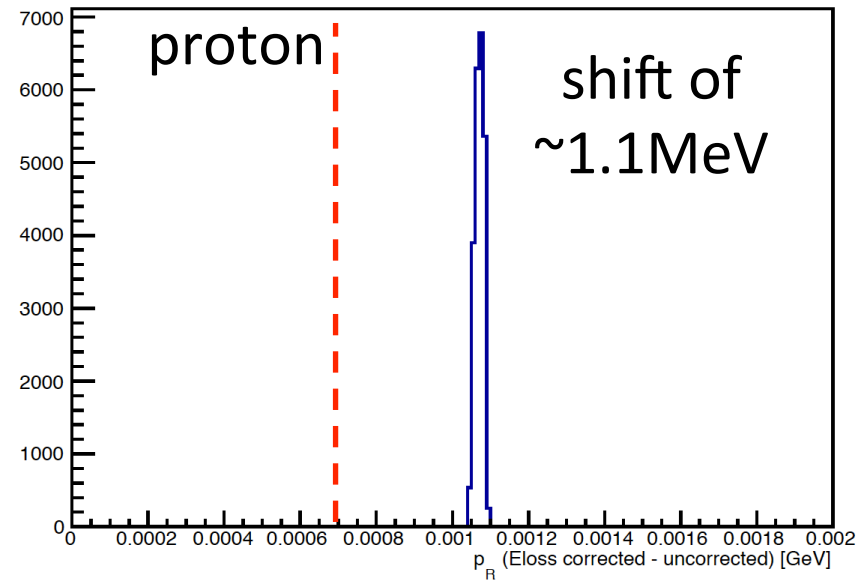
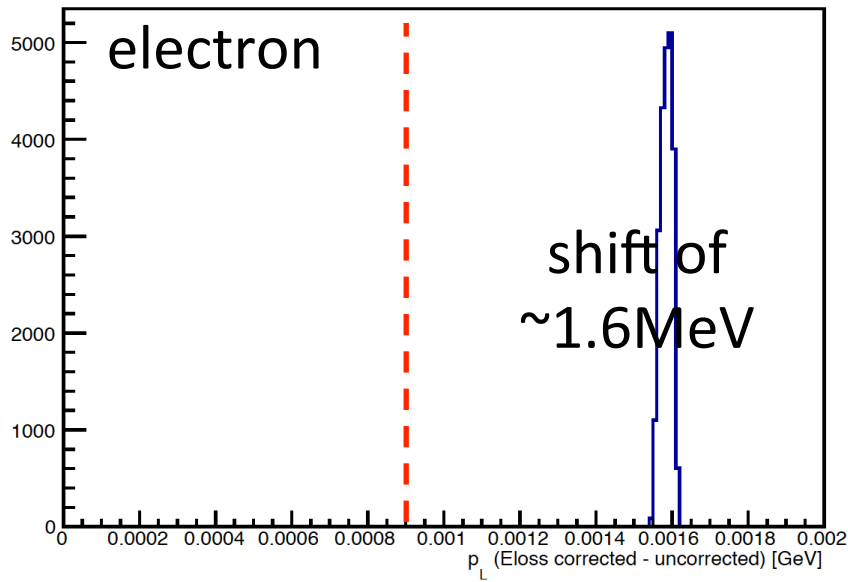
For most-probable Eloss equation check out "Particle Detectors" (2nd edition) - C.Grupen, B.Schwartz, Equation (1.22)

Energy Loss



--- Expectation from a simple most probable Eloss calculation.

- Eloss corrected E_{beam} should be lower than arc measurement (E_{beam} is measured, then beam loses energy)
- Eloss corrected scattered electron and proton track momenta should be higher than measured by spectrometers (tracks lose energy, then the momenta are measured)



Back to hydrogen data

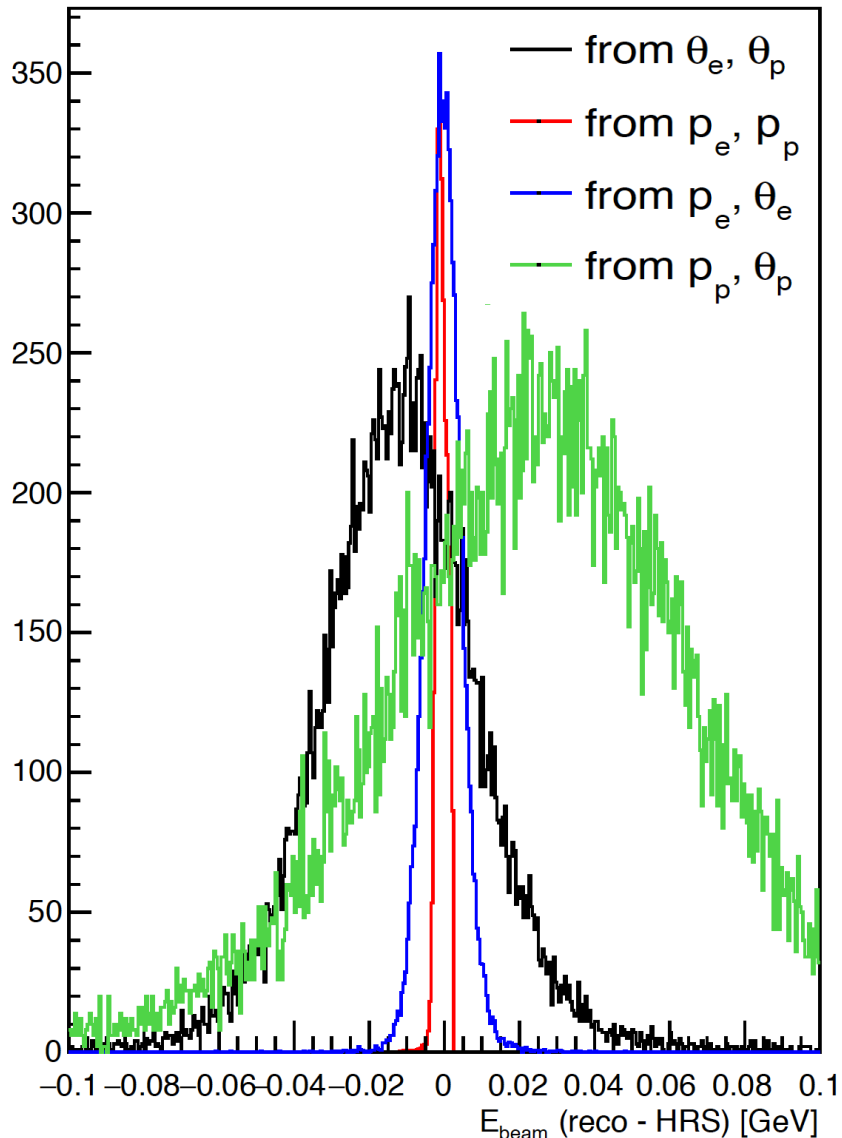
Total number of degrees of freedom in hydrogen elastic scattering:

Ebeam, electron 4-momentum, proton 4-momentum: 9
minus 1 from energy conservation: 8
minus 3 from momentum conservation: 5
minus 2 from $E^2=p^2+m^2$: 3
minus 1 because reaction happens on one plane: 2

Thus, given any two variables, any other quantity can be determined

Beam energy reconstructed from HRS

Before Eloss corrections

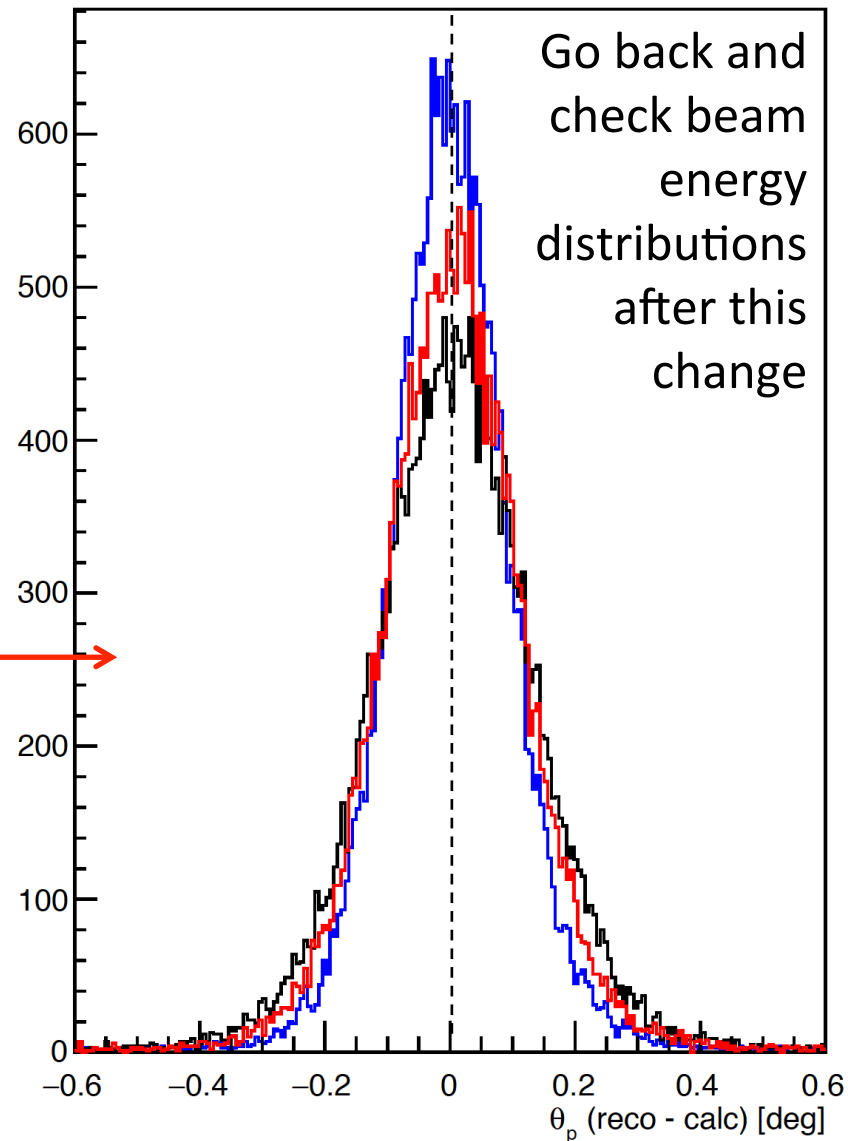
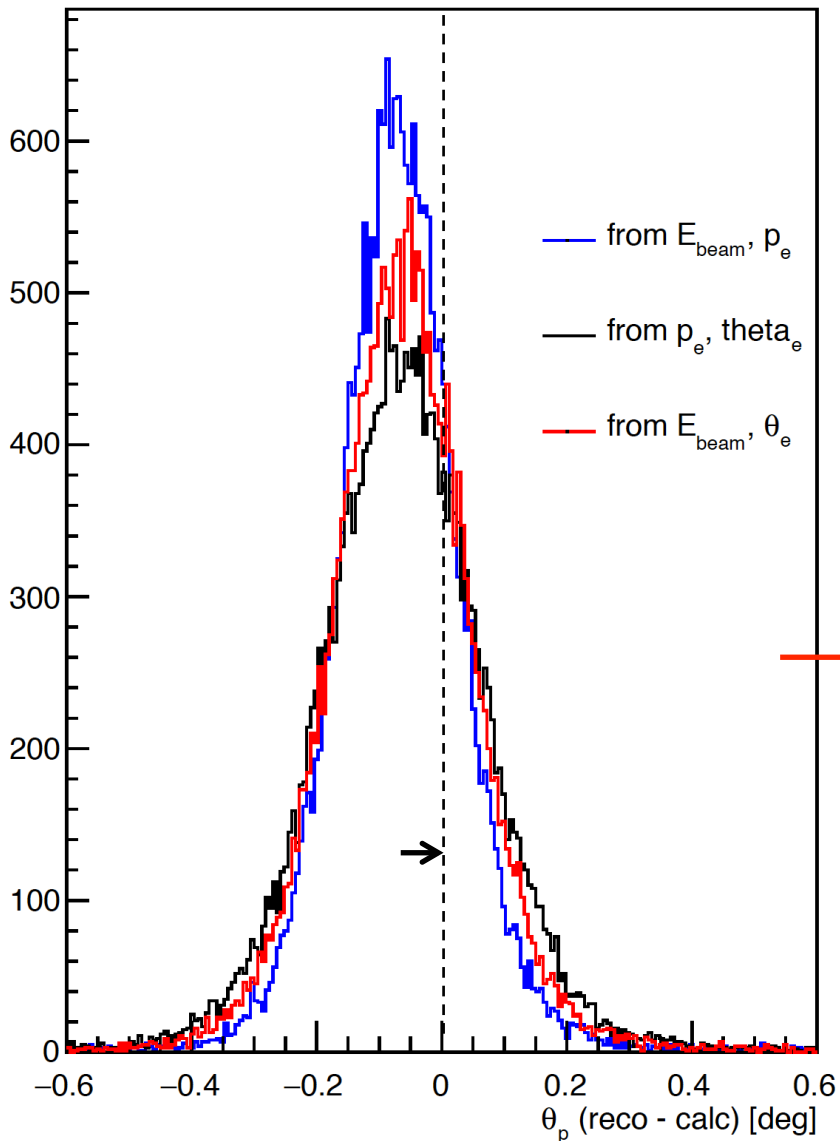


- “Taller” distributions are scaled down for comparison with “shorter” ones.
- The distributions that are more off-centered (and additionally broader) are those that depend on the proton scattering angle.
- Next step: play the game backwards, and try to reconstruct the proton angle from other variables.

Proton scattering angle

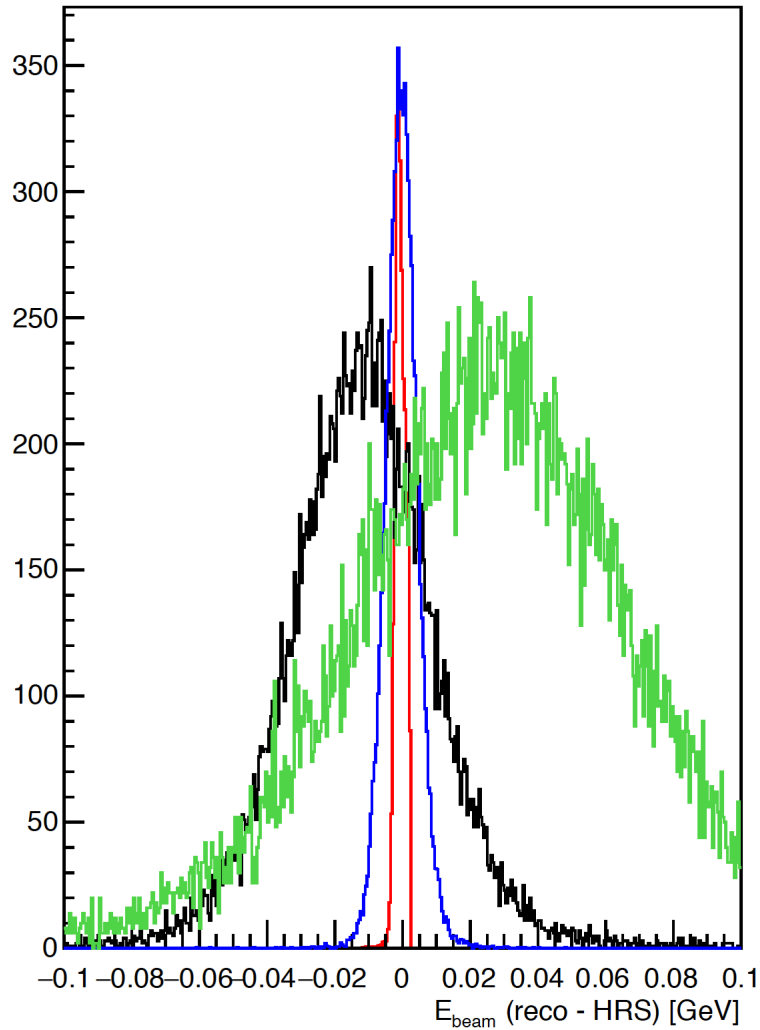
Before Eloss corrections

Before Eloss corrections



Beam energy reconstructed from HRS

Before Eloss corrections



Correcting
proton
scattering
angle \rightarrow

Before Eloss corrections

