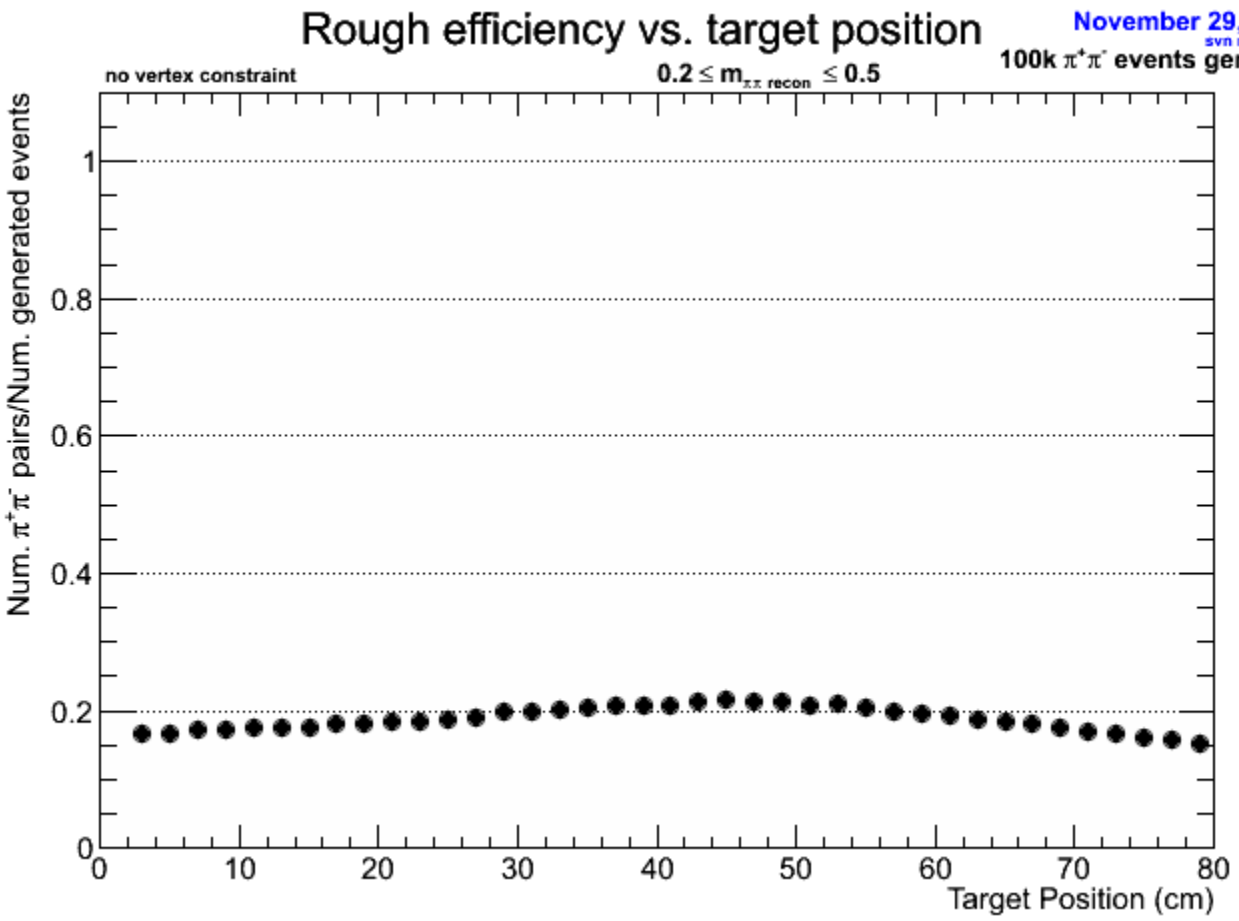
Charged Pion Polarizability Simulation Studies

David Lawrence JLab

Nov. 30, 2012

Reconstruction Efficiency

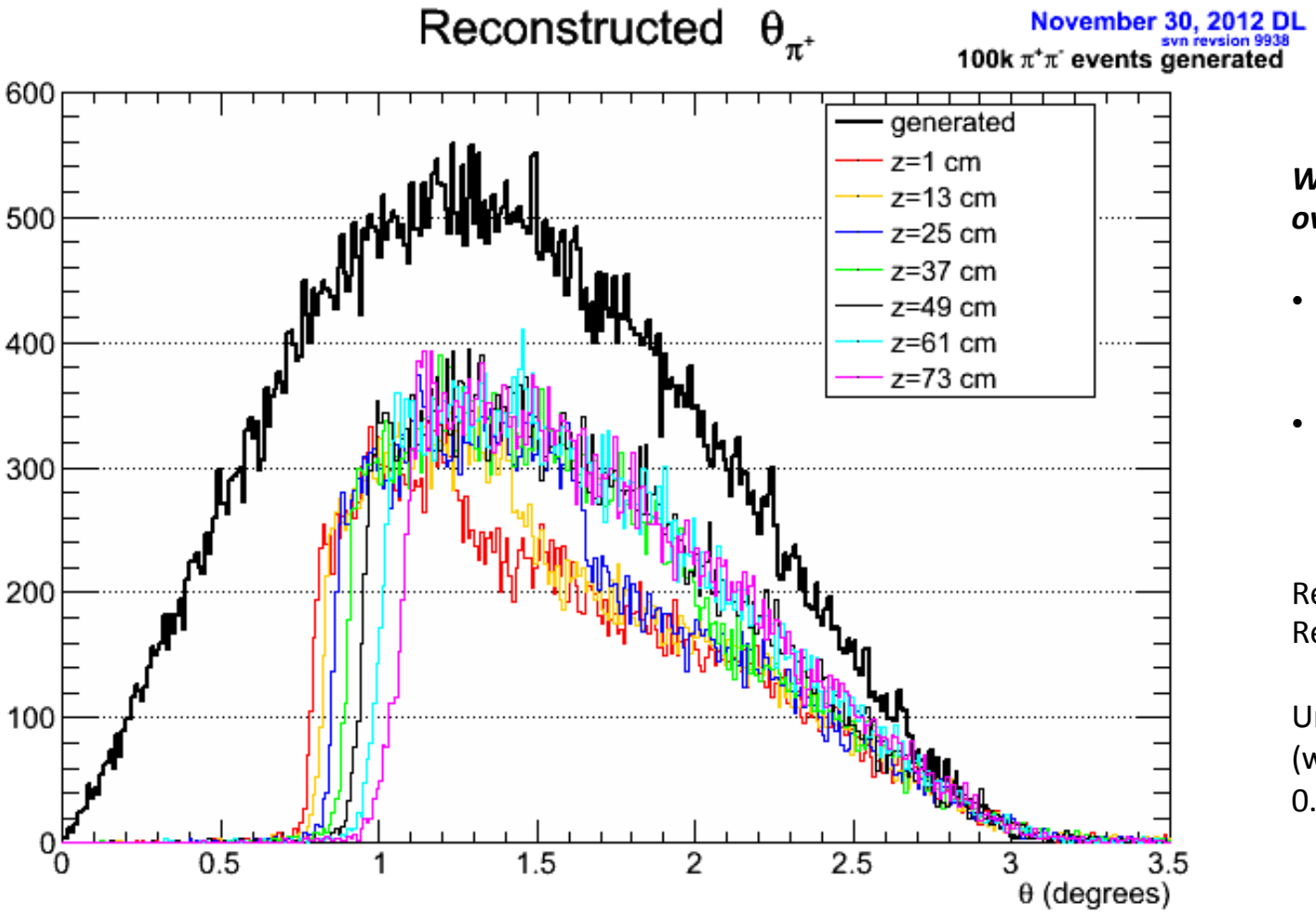


Expect efficiency to increase as target is pulled upstream (smaller values on x-axis).

For z-values smaller than z≈45 the efficiency decreases.

Why?

Polar angle



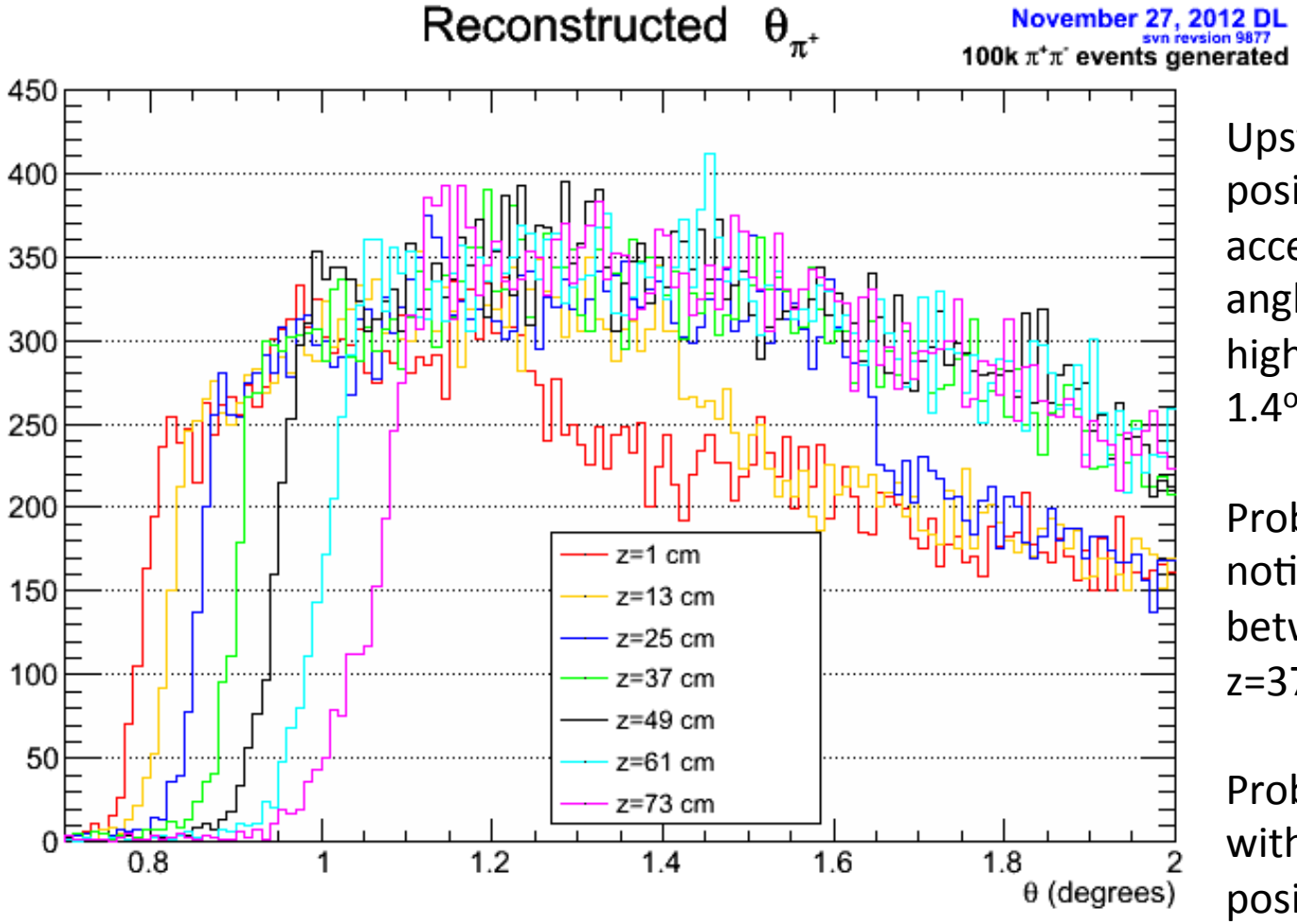
Why peak efficiency is just over 20%

- Acceptance cuts off a lot at very low angles (below 1^o)
- Multiple scattering of small angle(1^o-3^o) tracks

Reconstructed π^+: 44.6k
Reconstructed π^-: 53.8k

Uncorrelated acceptance (w/o cut on $M_{\pi\pi}$)
0.446*0.538 = 0.24

Efficiency loss at 1.4°

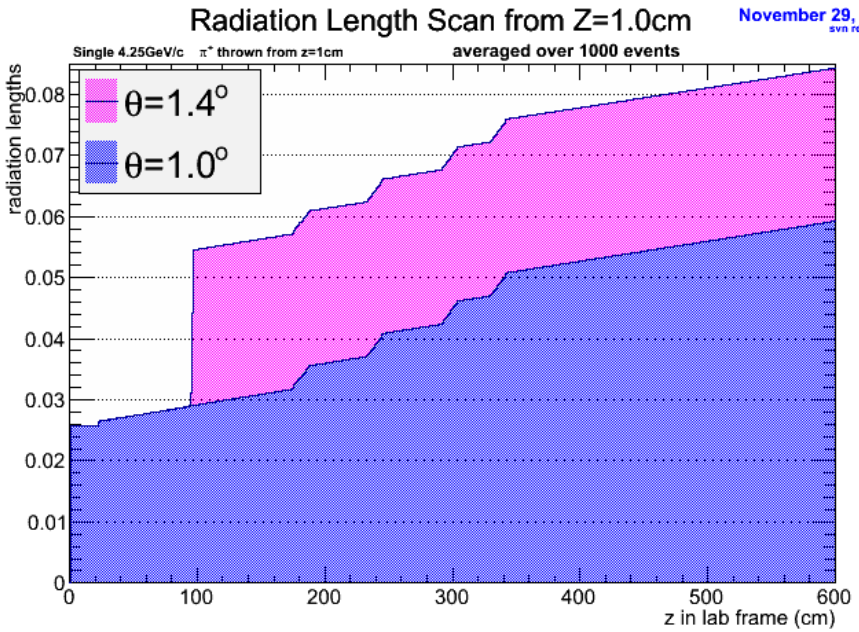


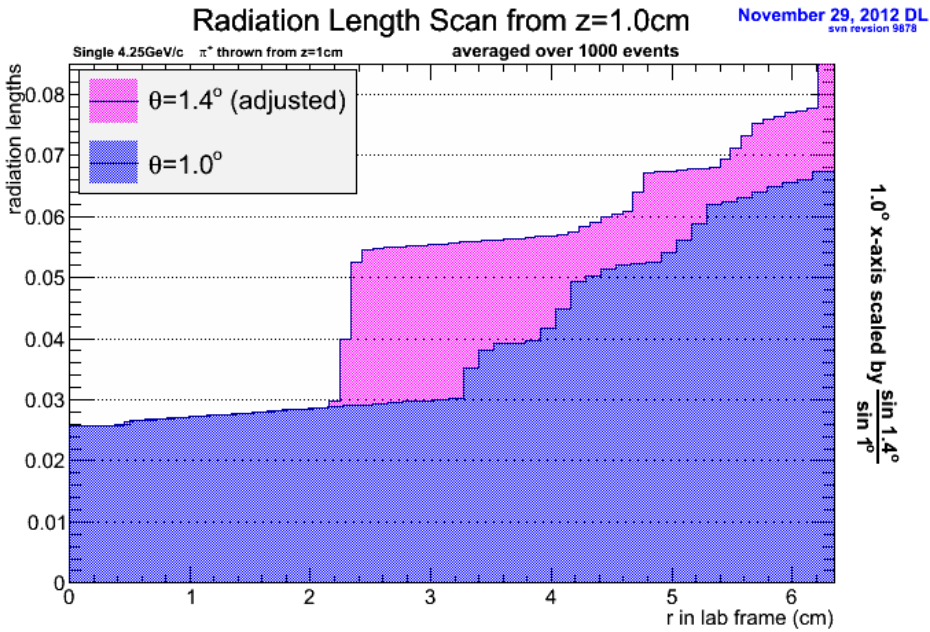
Upstream target positions gain acceptance for lower angles, but lose it for higher ones (e.g. 1.4°)

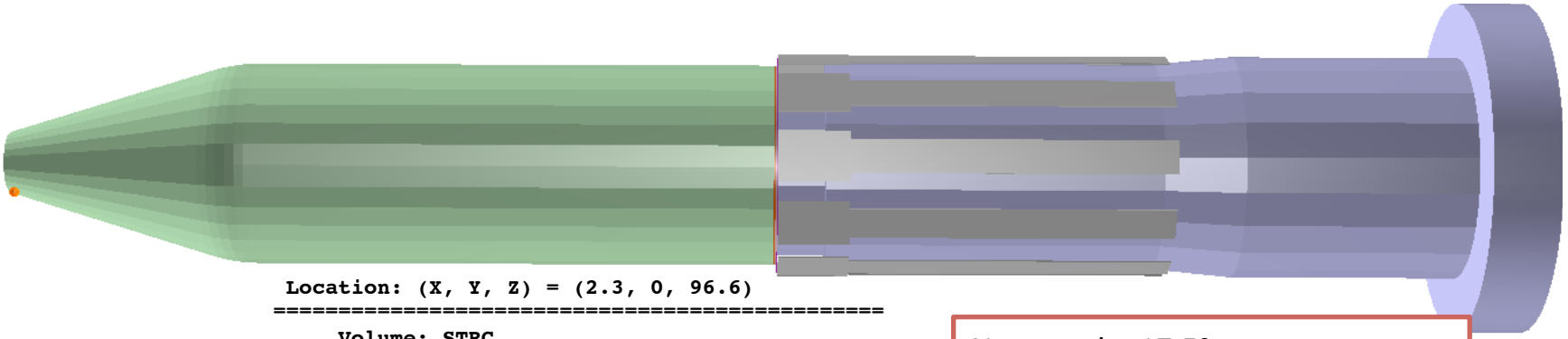
Problem is noticeable starting between z=25 and z=37

Problem gets worse with more upstream positions of target

Start Counter is in the way







```
 Location: (X, Y, Z) = (2.3, 0, 96.6)
================================================
     Volume: STRC
   material: Scintillator
    density: 1.032 g/cm^3
rad. length: 42.1442 cm
          A: 11.0618
          Z: 5.56867
  ancestory: STRC -> STRT -> LASS -> HALL -> SITE
```

Nose angle=17.5°
Trajectory=1.4°
Material=3mm/sin(18.9°) = 9.3mm
or 0.022 rad. lengths

…next steps

- Re-running farm jobs with start counter package removed
- Still issue with floating vertex constraint location (will resolve soon and re-run with that as well)
- Introduce EM background
- Signal background simulation (?)
- π^o simulation (?)