

CDC Simulation Studies For Geometries C, F, H, & I

Nov. 20, 2008

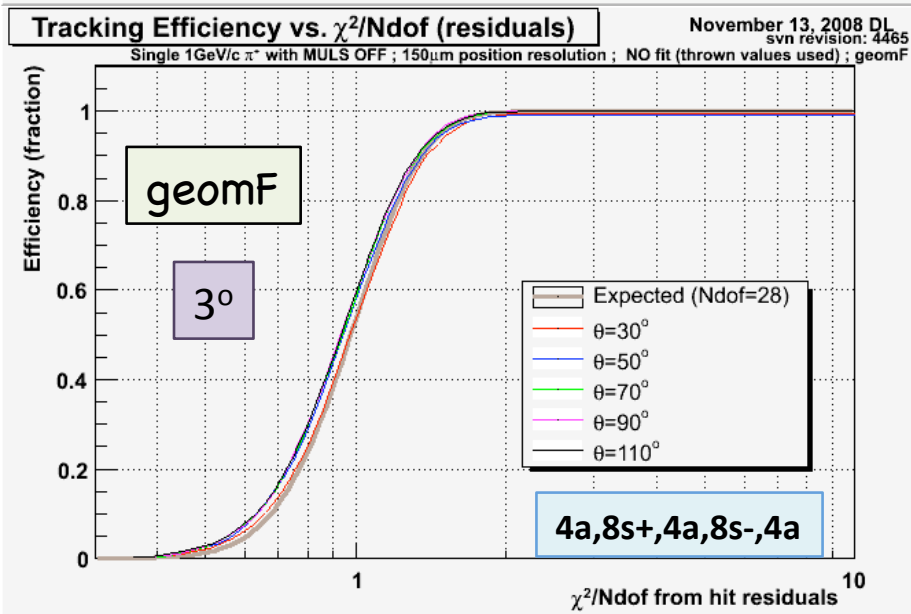
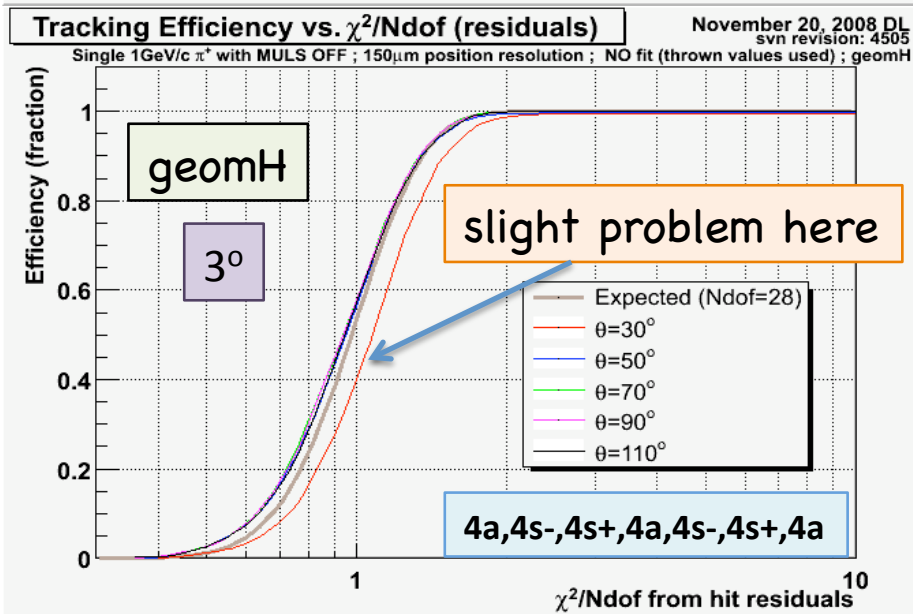
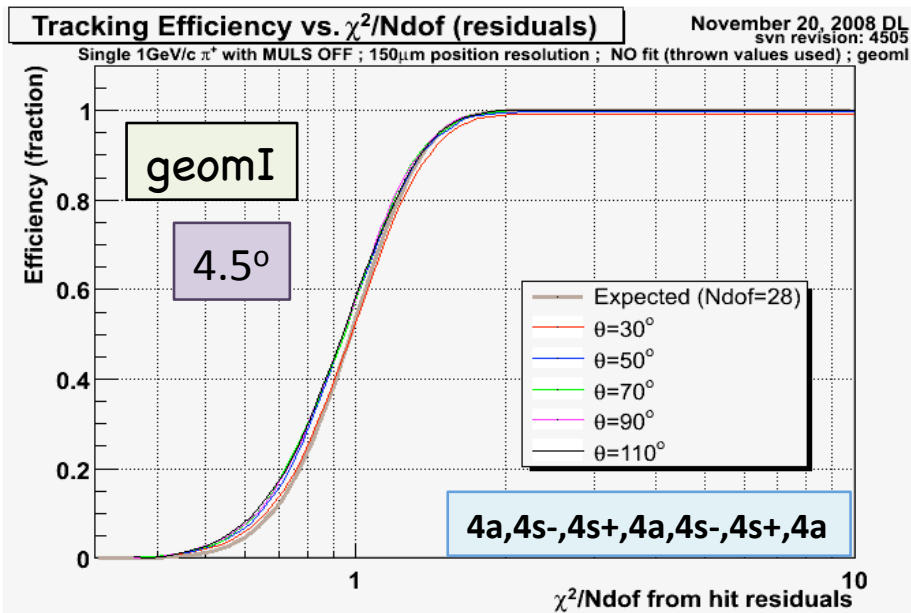
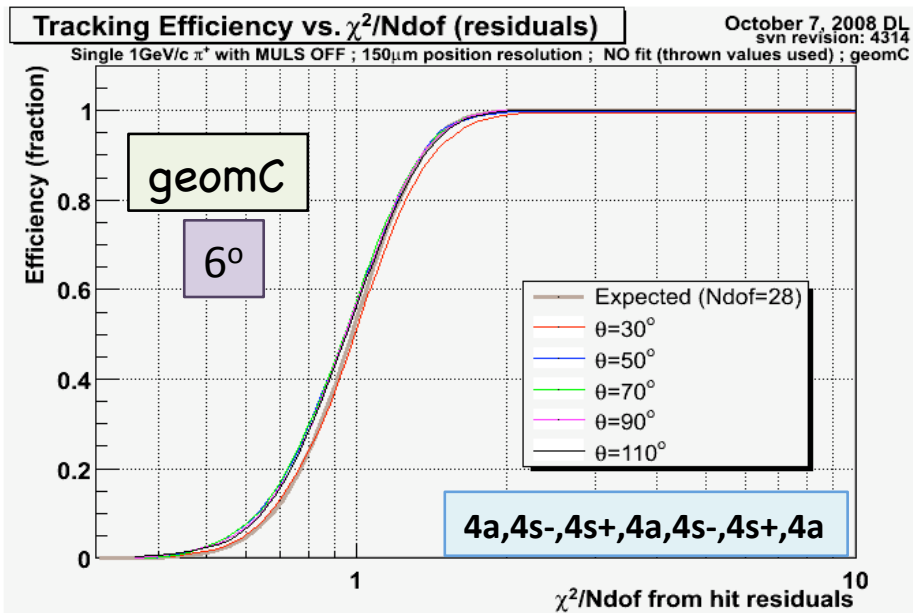
David Lawrence JLab

2 New Geometries Studied

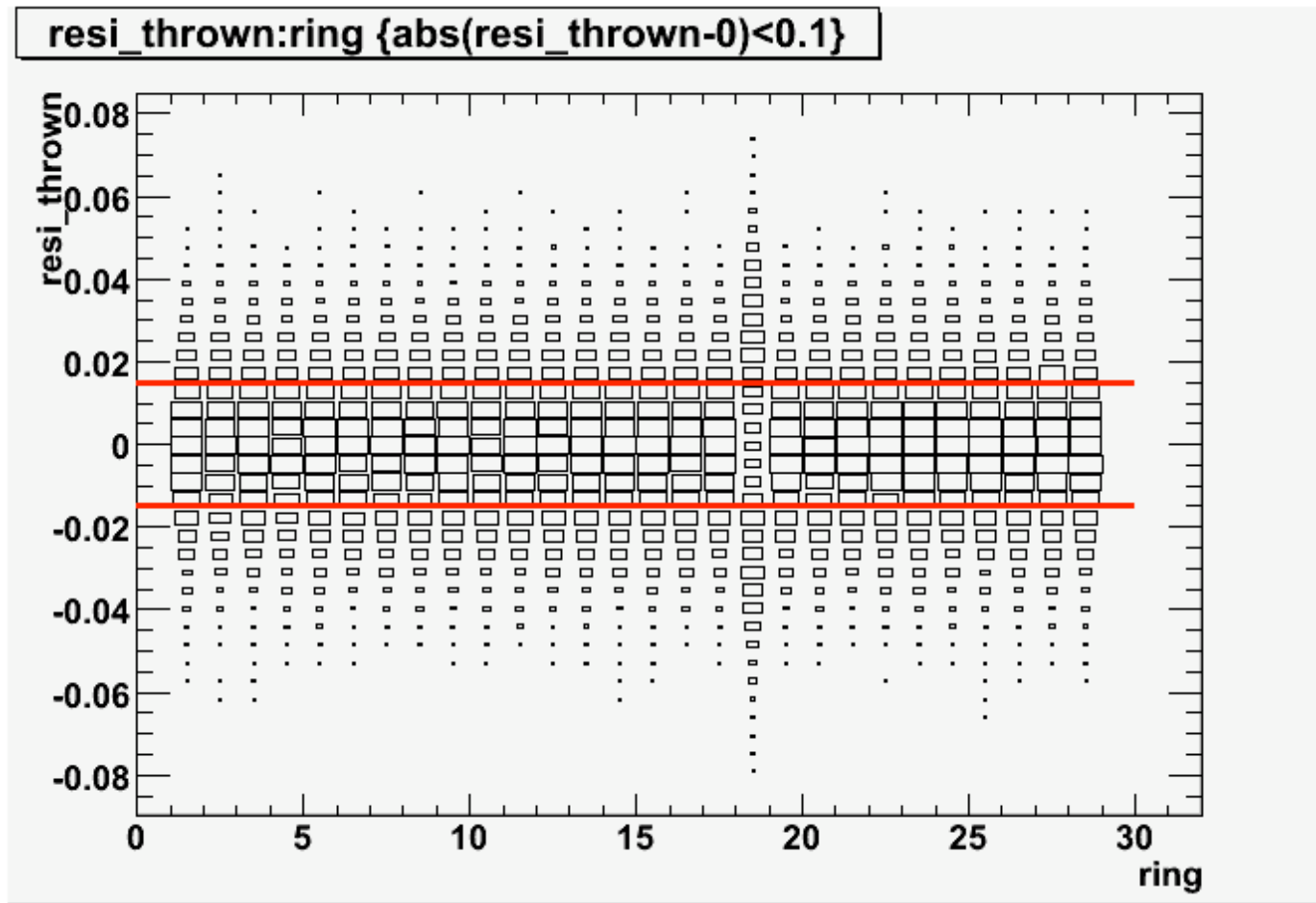
geomH and geomI are the same as geomC but with 3° and 4.5° stereo angles respectively

| Geometry C | Geometry F | Geometry H | Geometry I |
|---------------------|---------------------|---------------------|-----------------------|
| 4 axial | 4 axial | 4 axial | 4 axial |
| 4 stereo $+6^\circ$ | 8 stereo -3° | 4 stereo $+3^\circ$ | 4 stereo $+4.5^\circ$ |
| 4 stereo -6° | 4 axial | 4 stereo -3° | 4 stereo -4.5° |
| 4 axial | 8 stereo $+3^\circ$ | 4 axial | 4 axial |
| 4 stereo $+6^\circ$ | 4 axial | 4 stereo $+3^\circ$ | 4 stereo $+4.5^\circ$ |
| 4 stereo -6° | | 4 stereo -3° | 4 stereo -4.5° |
| 4 axial | | 4 axial | 4 axial |

Cumulative $\chi^2/Ndof$ for "Truth" tracks

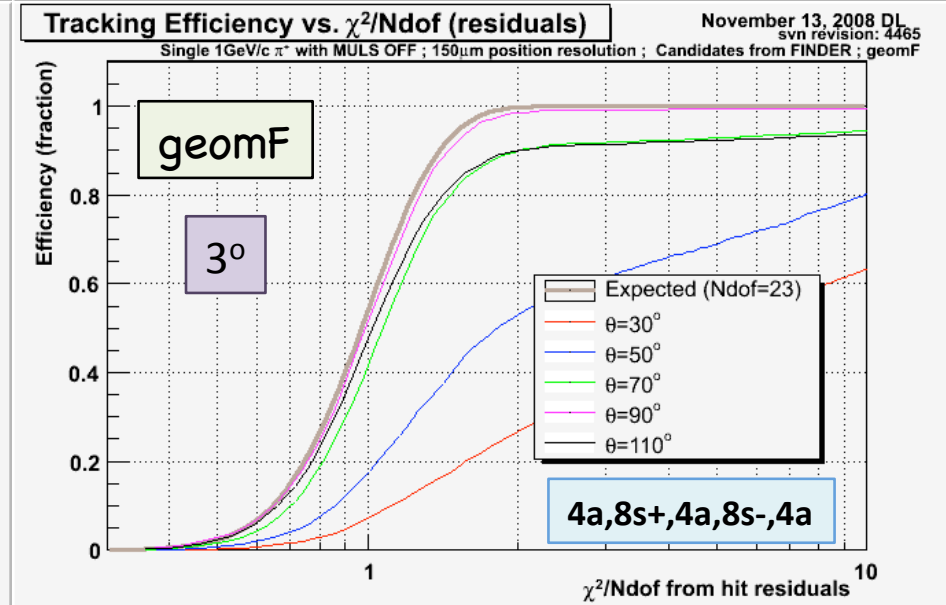
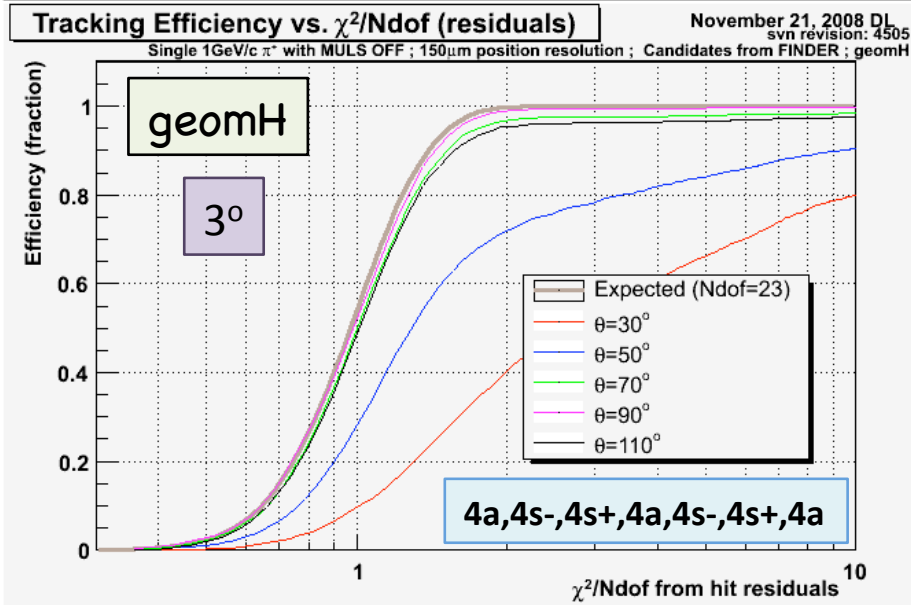
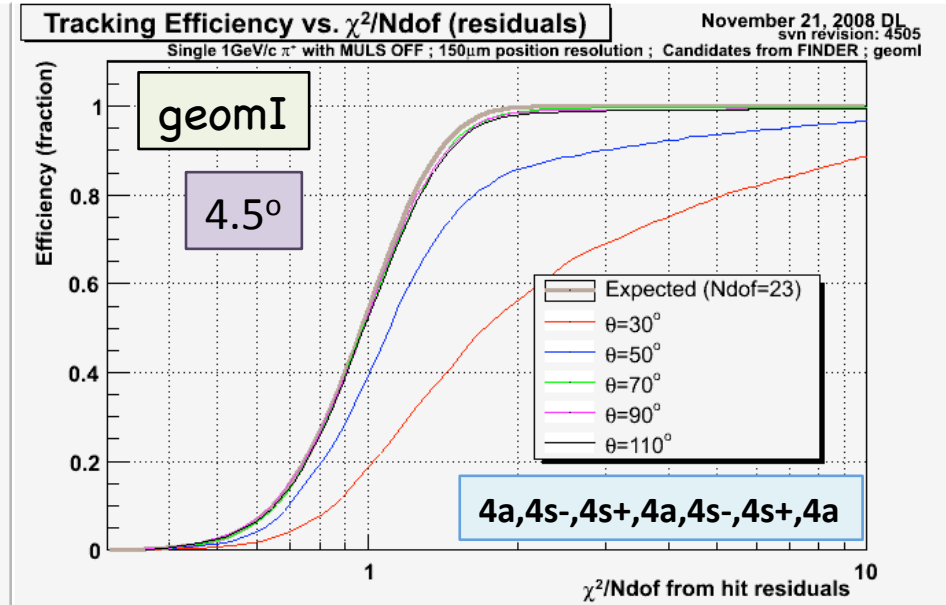
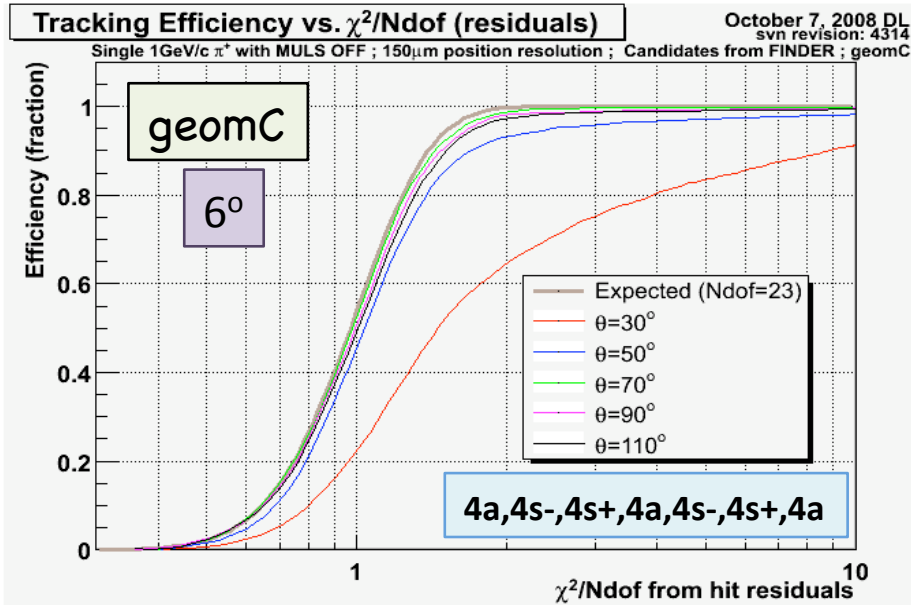


geomH: A small problem with layer 18 (effective $\sigma=275\mu\text{m}$ instead of $150\mu\text{m}$)



This may be due to an overlap of some of the straws. It does not appear to affect the number of hits per track so I don't think it drives the result much.

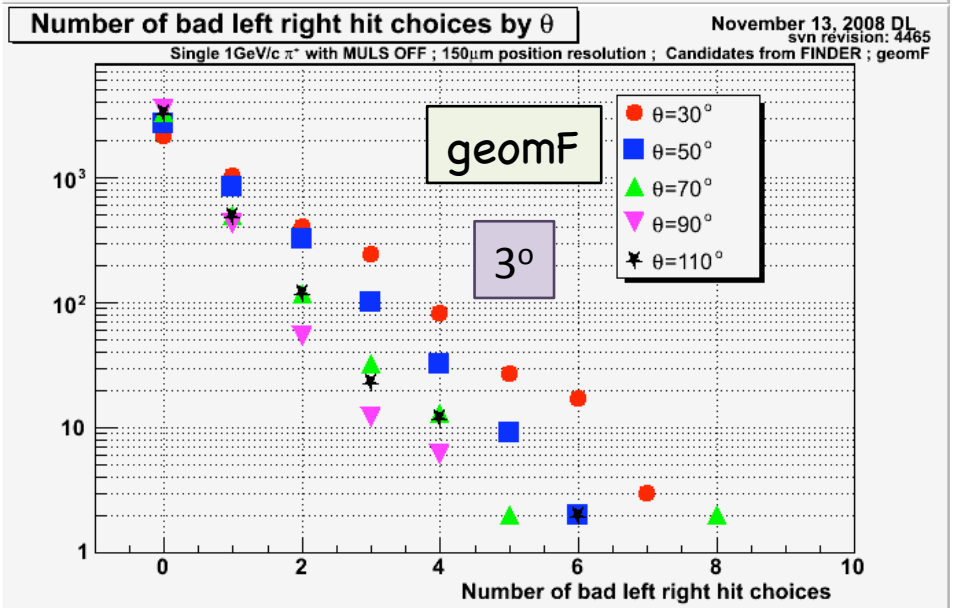
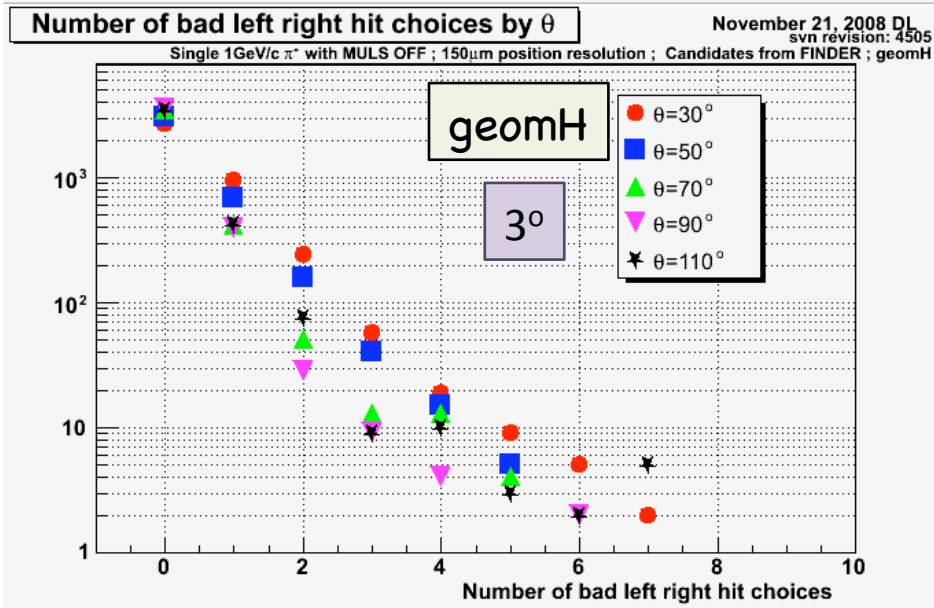
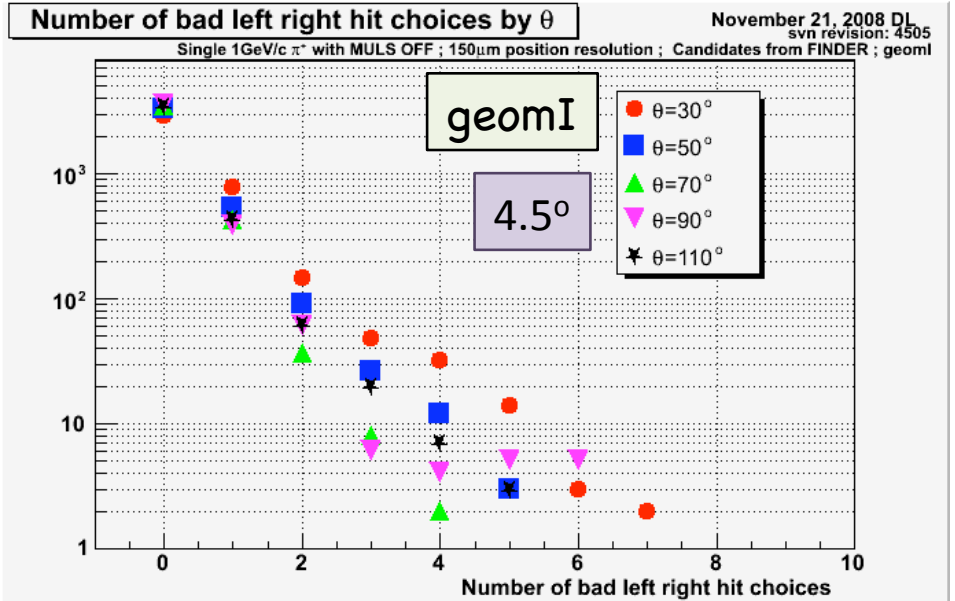
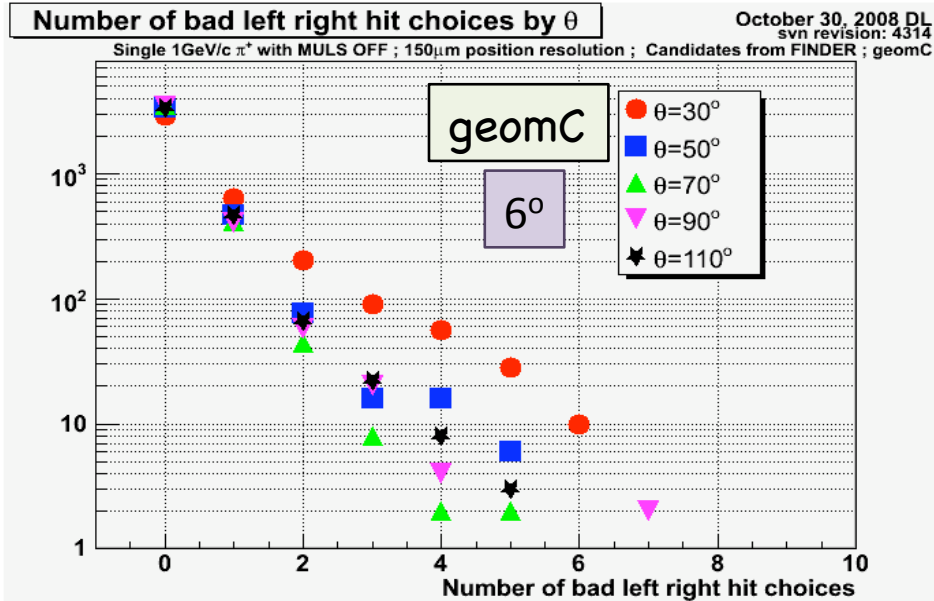
Full Reconstruction



Tracking efficiency gets worse as the stereo angle decreases

Bad L-R Choice Rates

L-R choice efficiency actually seems better for smaller stereo angles!



Conclusions

- Overall Tracking efficiency is better with larger stereo angles (6° vs. 4.5° or 3°)
- Left-right ambiguity resolution is better with smaller stereo angles

I believe this is because the resolving power for left-right of the axial wires increases as the stereo angle decreases, approaching the “all-axial” limit.

At the same time, the z-resolution of the stereo wires gets worse with decreasing stereo angle giving a poorer theta resolution resulting in a larger chi-sq/Ndof

In the end, we appear to lose more in z-resolution than we gain in left-right ambiguity resolution