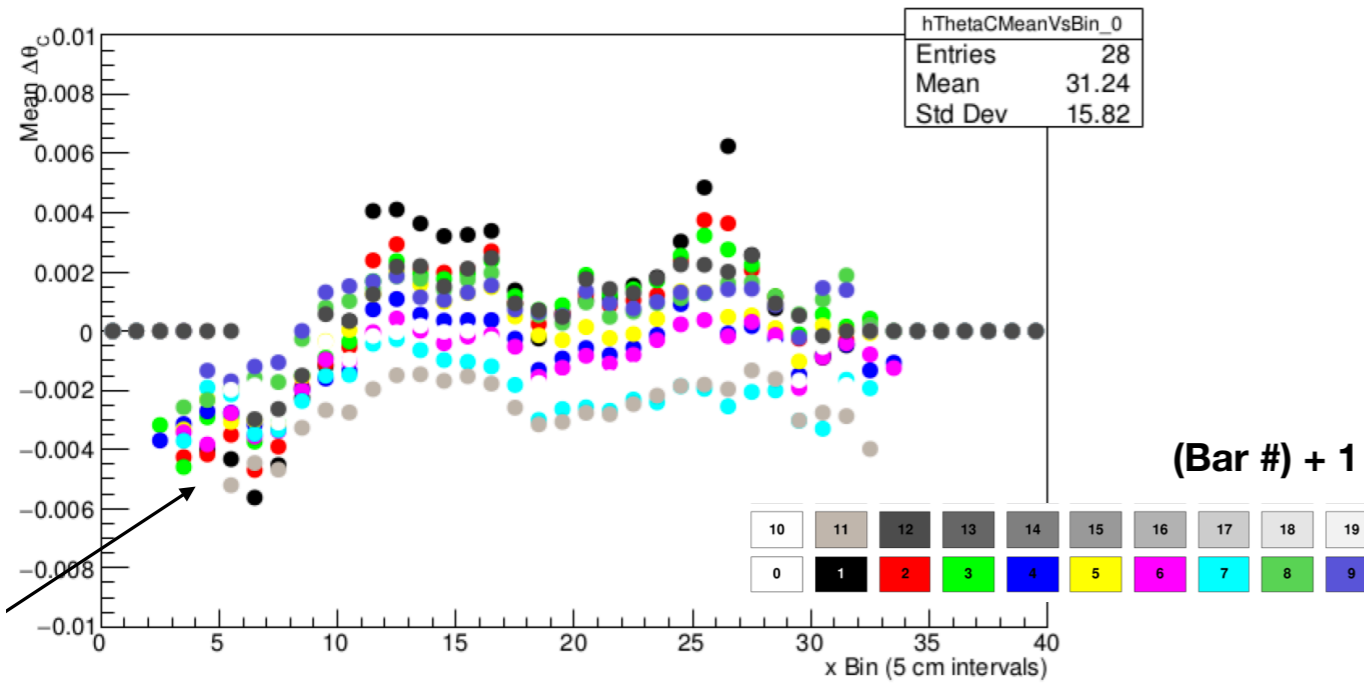


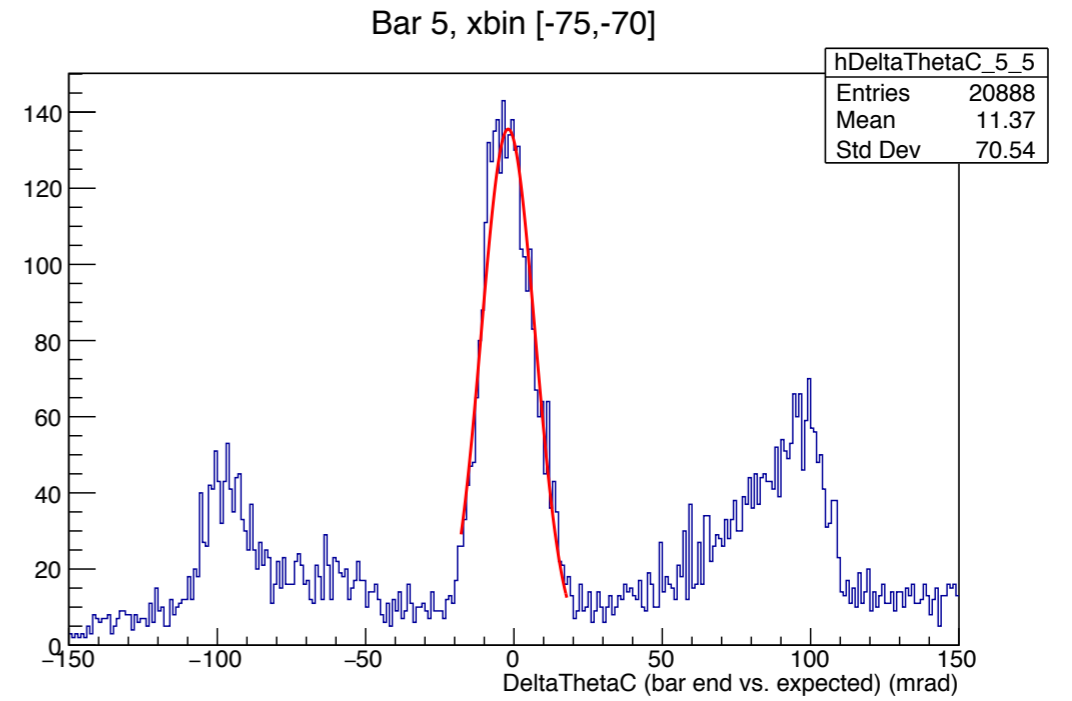
Tracking-DIRC alignment study

- For each track, take the extrapolated values (from the tracking system) as the “assumed”
- Rotate the DIRC bar plane along x-, y- and z-axis and calculate the resultant “true” impinging angles for this track
- Generate and propagate Cherenkov photons to the end of the bars using the “true”
- Calculate the dot product $\vec{k}_{\text{photon}} \cdot \vec{k}_{\text{assumed}}$ to get the Cherenkov angle (including photon dir. ambiguities)
- Form $\Delta\theta_C = \theta_{C,\text{calc.}} - \theta_{C,\text{exp.}}$ and fit to obtain bias
- Do this in bins of x (along the bar) and bar number to see if we can reproduce what Justin showed at last meeting (6/25/19)

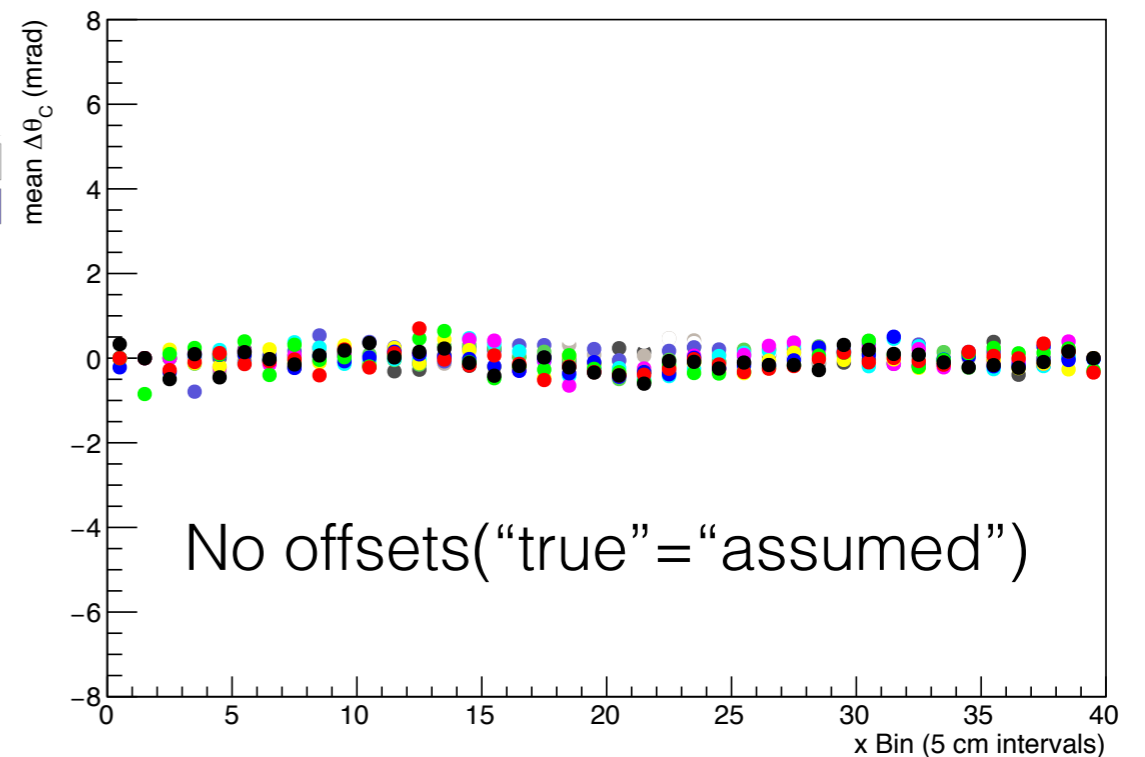
Justin's results



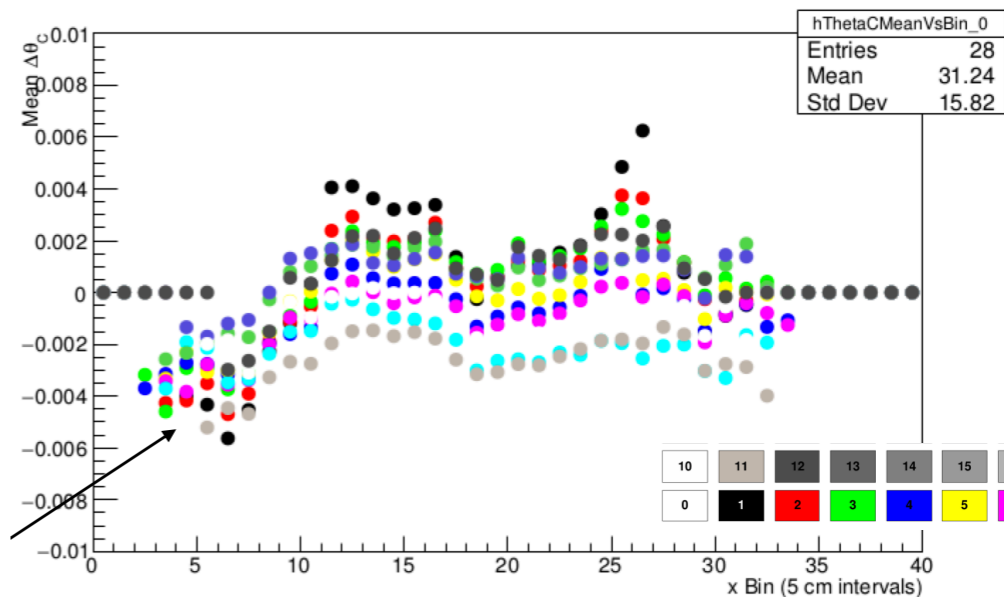
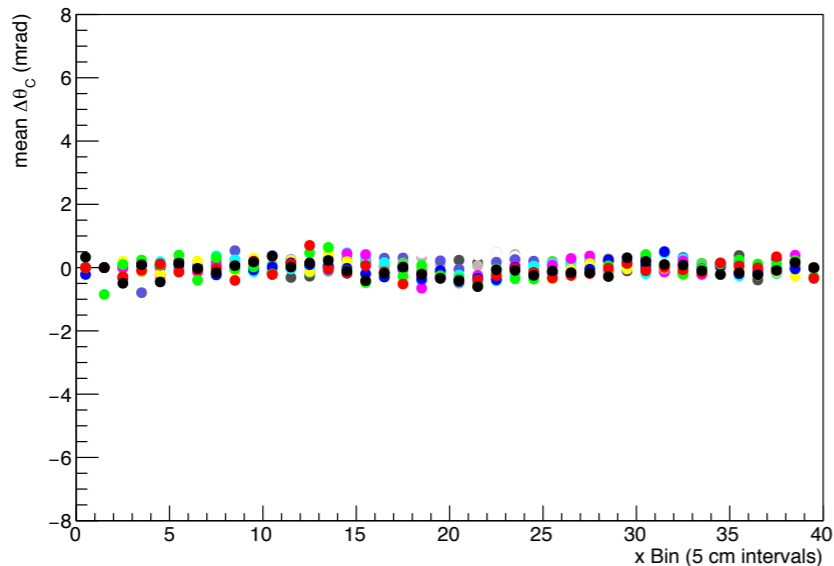
- Same coloring as Justin's study
- Considered only Bar Box #10 (closer to beamline)
- Rotations are currently done w.r.t. the center of a bar box assembly



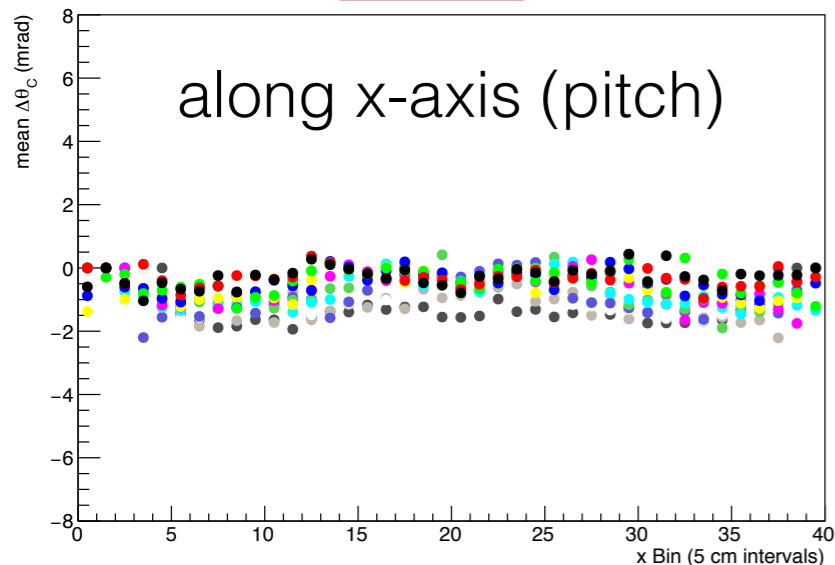
NoOffsets (deg/cm)



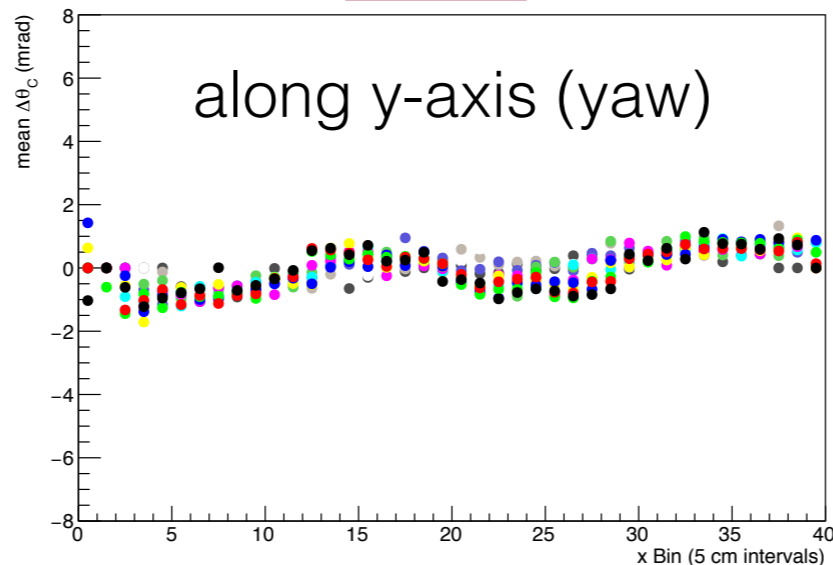
NoOffsets (deg/cm)



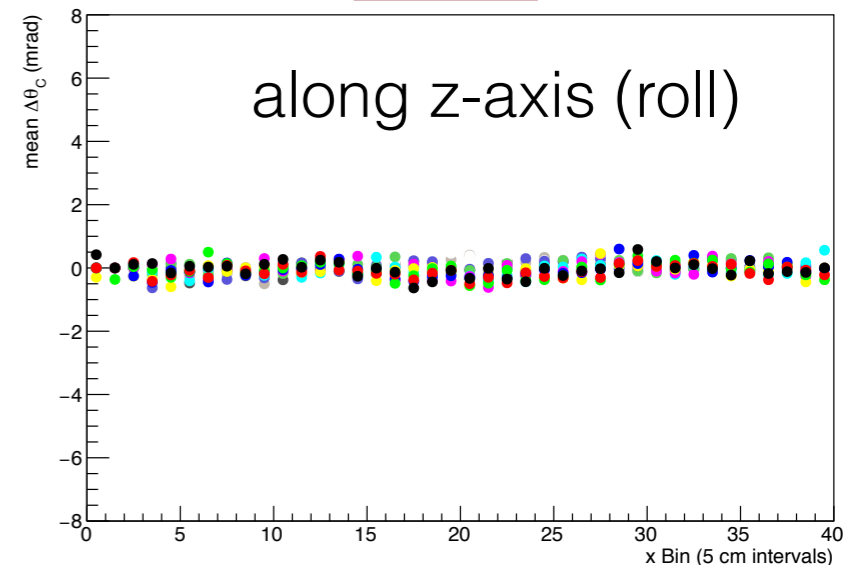
BB10_xangle_0.25 (deg/cm)



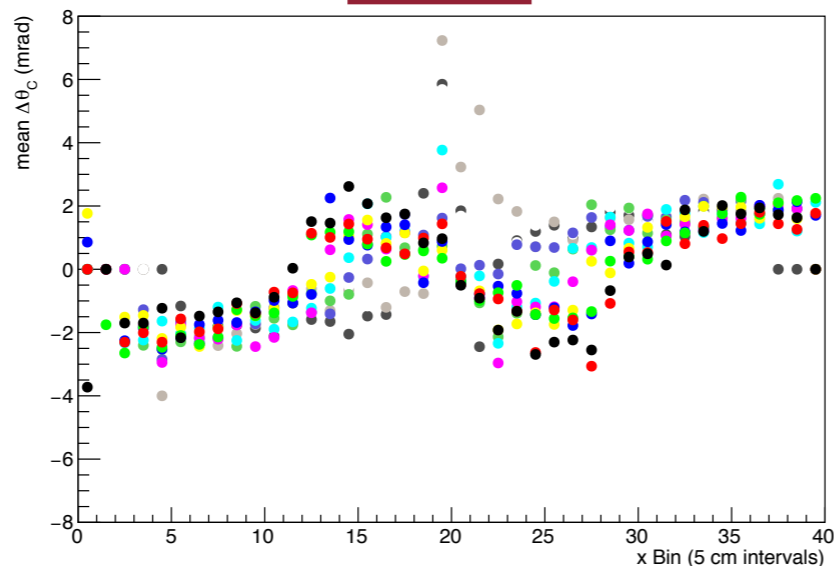
BB10_yangle_0.25 (deg/cm)



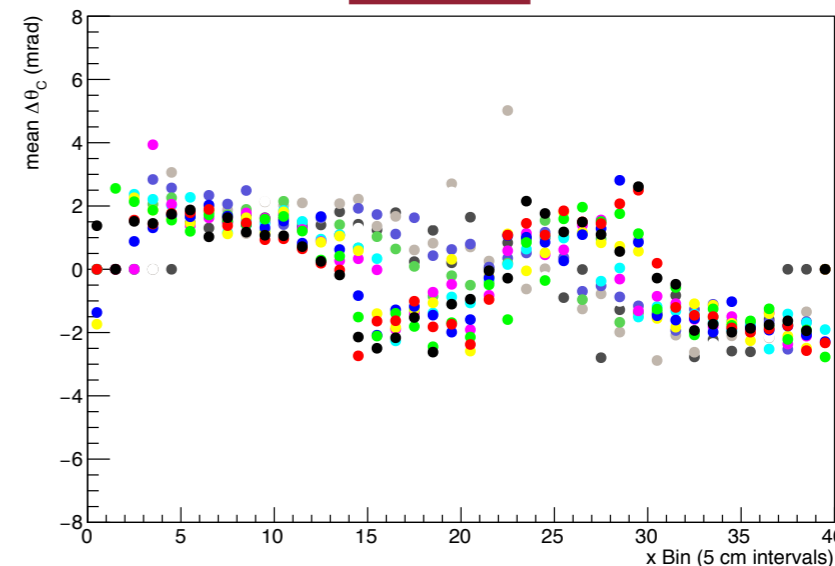
BB10_zangle_0.25 (deg/cm)

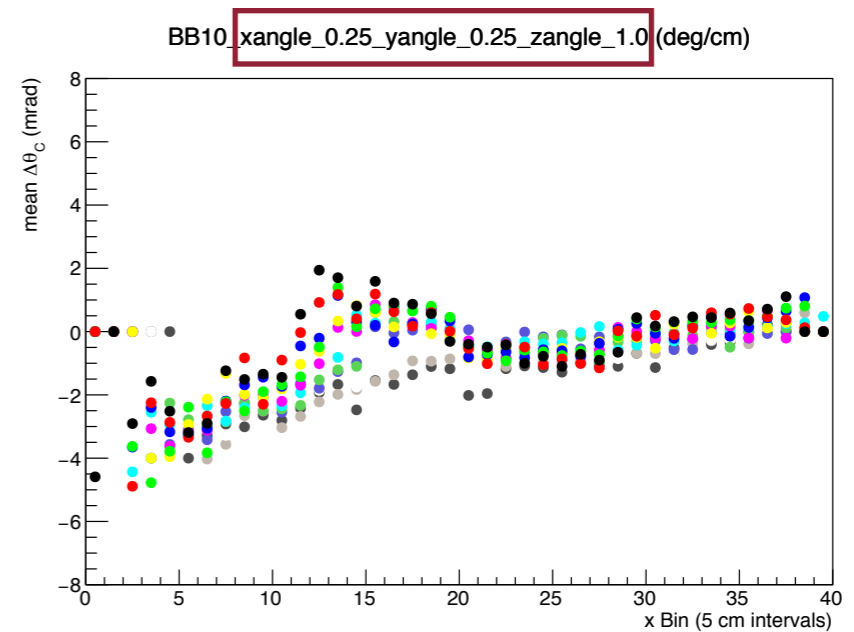
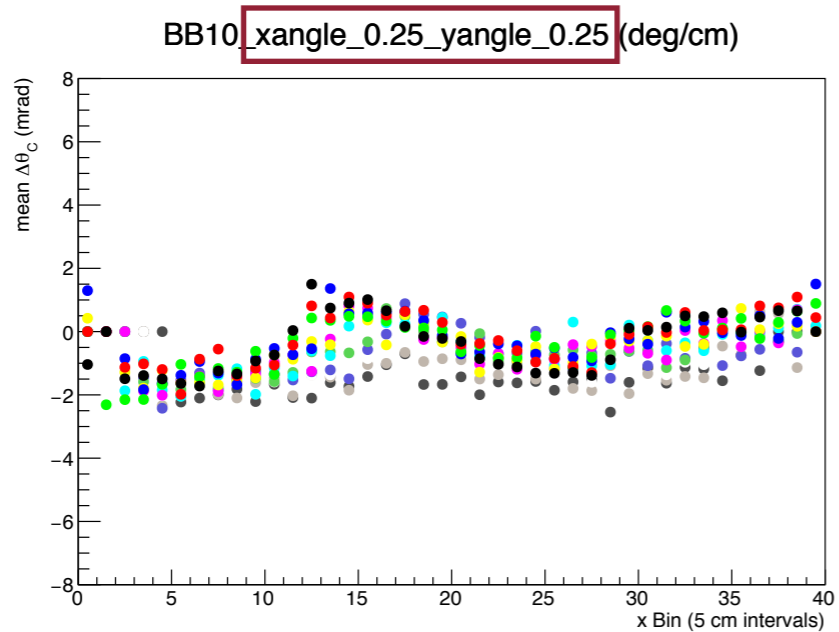
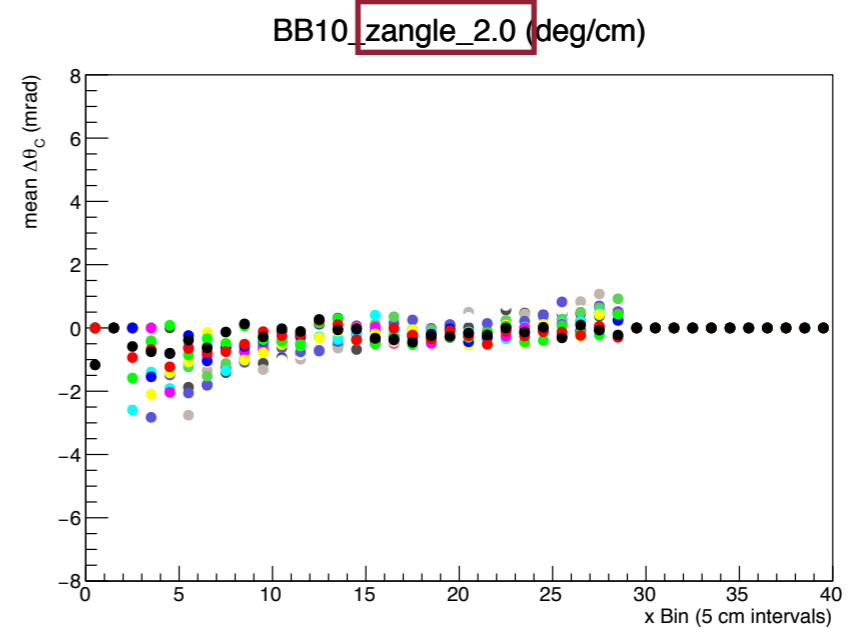
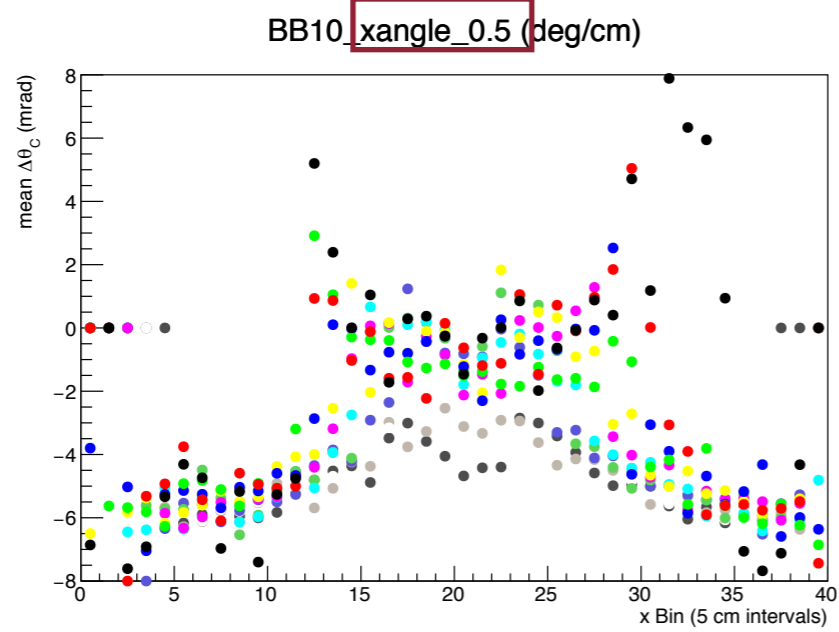
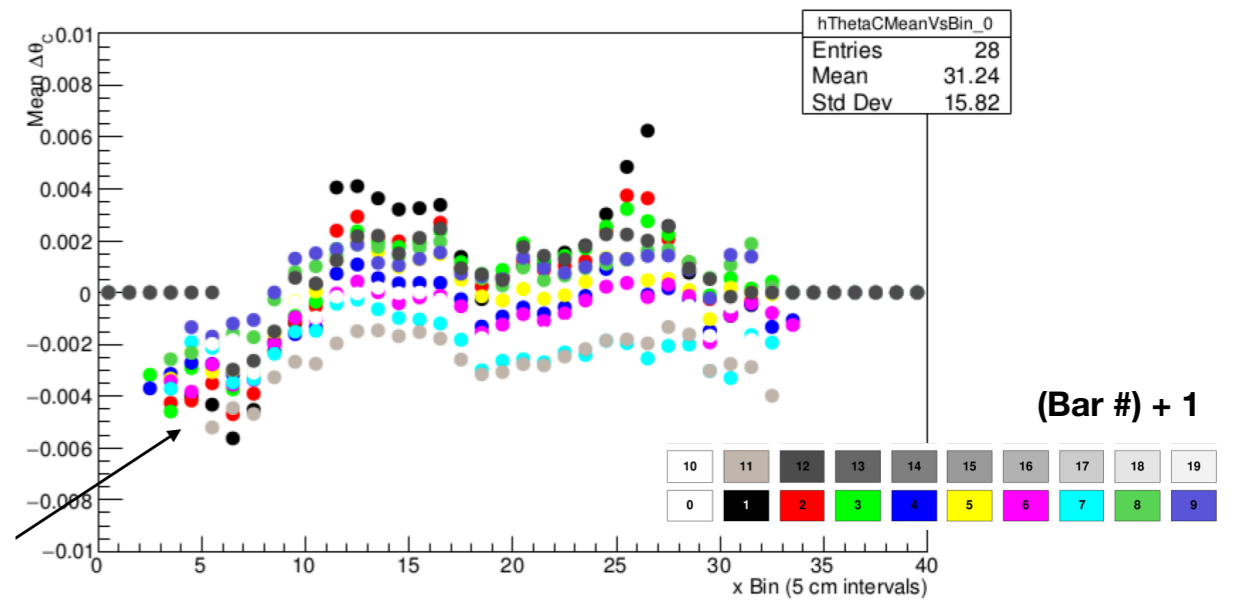
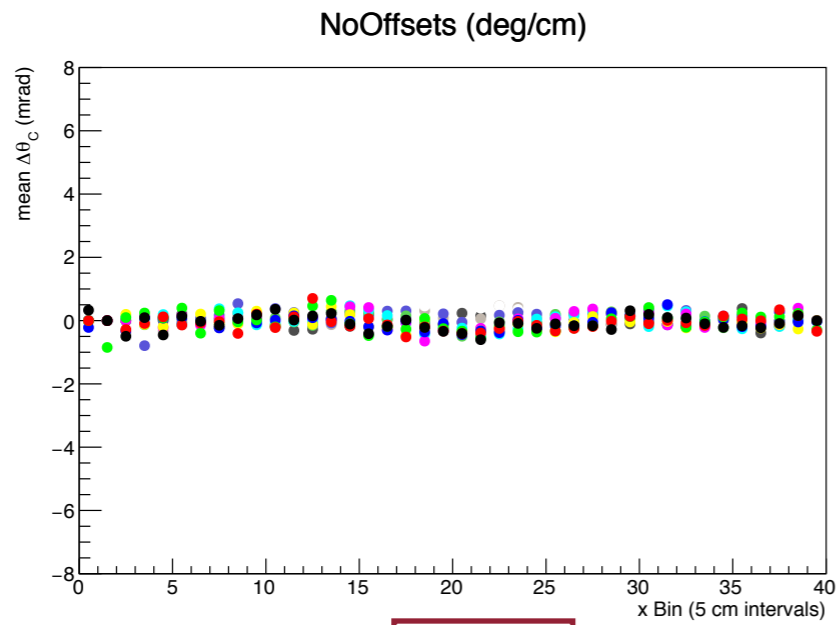


BB10_yangle_0.5 (deg/cm)



BB10_yangle_-0.5 (deg/cm)





- Initial result seems encouraging, indicating some potential bias in alignment of the DIRC system w.r.t. the tracking system.
- Tried $(x,y,z) = (0.25,0.25,1.0)$ deg. offset combination on a few runs with FastDIRC reconstruction and seems to produce some improvement at $\sim 5\%$ level (example below)
- Need to do a systematic optimization for best extraction of those offsets.

