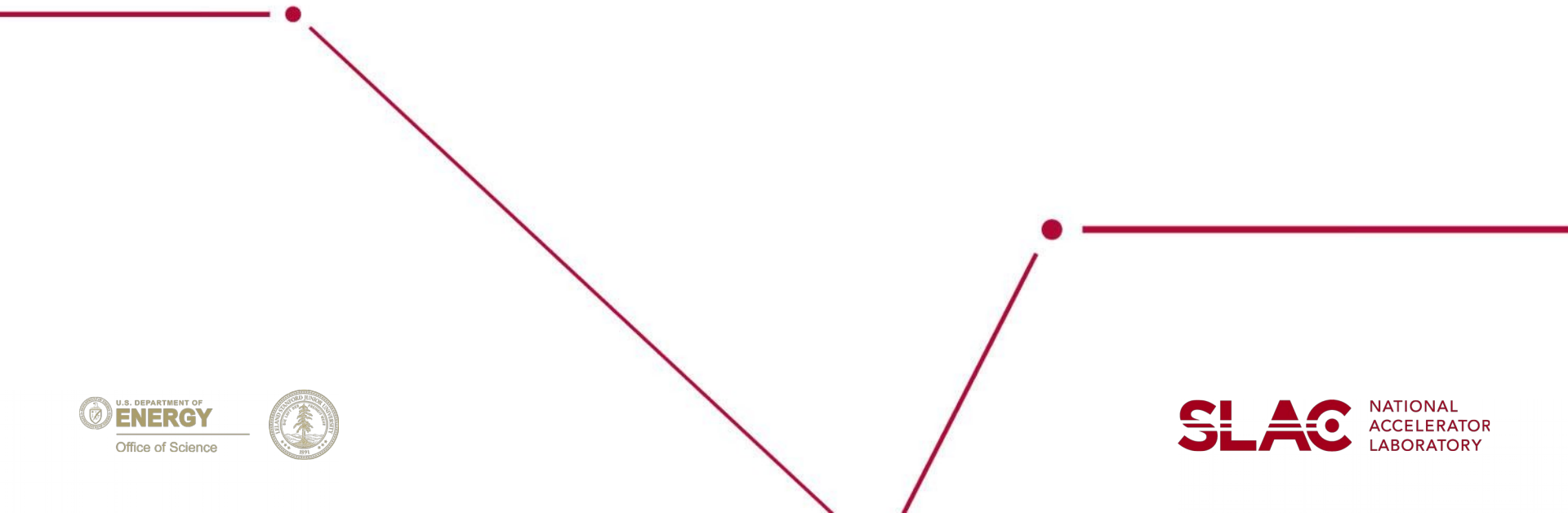
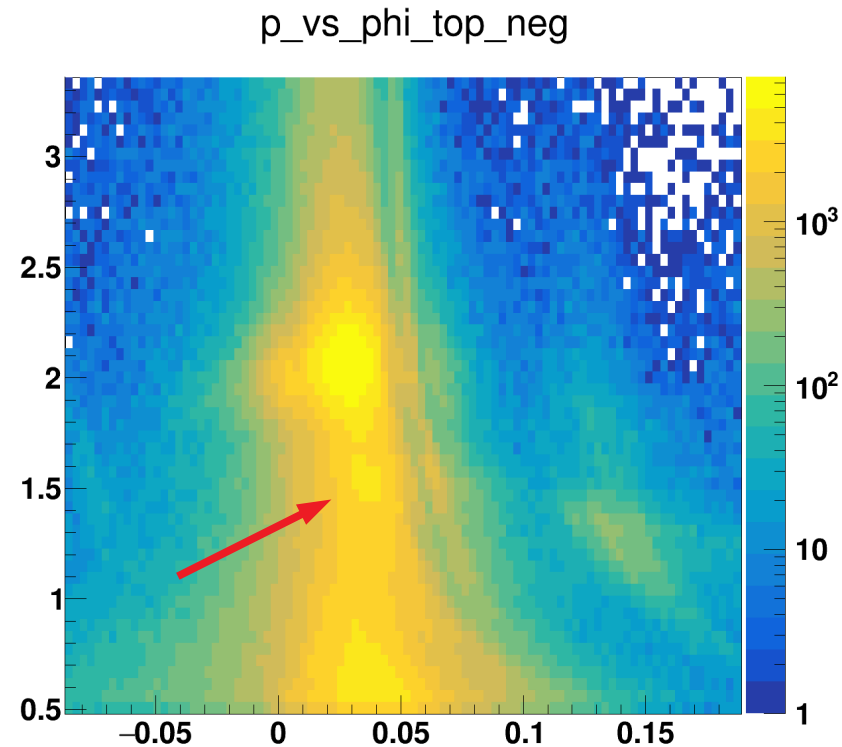


Taking out Another Momentum Bifurcation

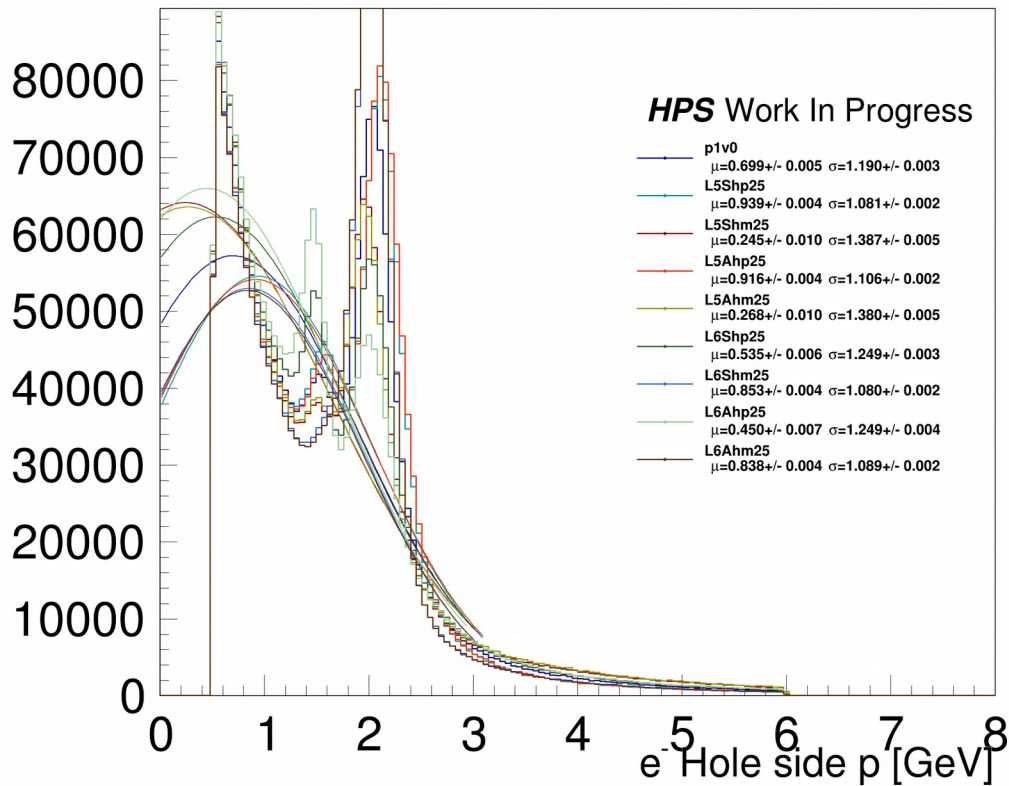
Cameron Bravo (SLAC)



- Focus on momentum bifurcation
- In the top this time
- Seen in run 14654 which is a high lumi physics run at 1.92 GeV beam energy
- Accidental FEEs have extra peak at about 1.4 GeV
- Tracks are missing layer 7 hits in lower peak
- What do we need?
- Where are we going?
- How are we getting there?

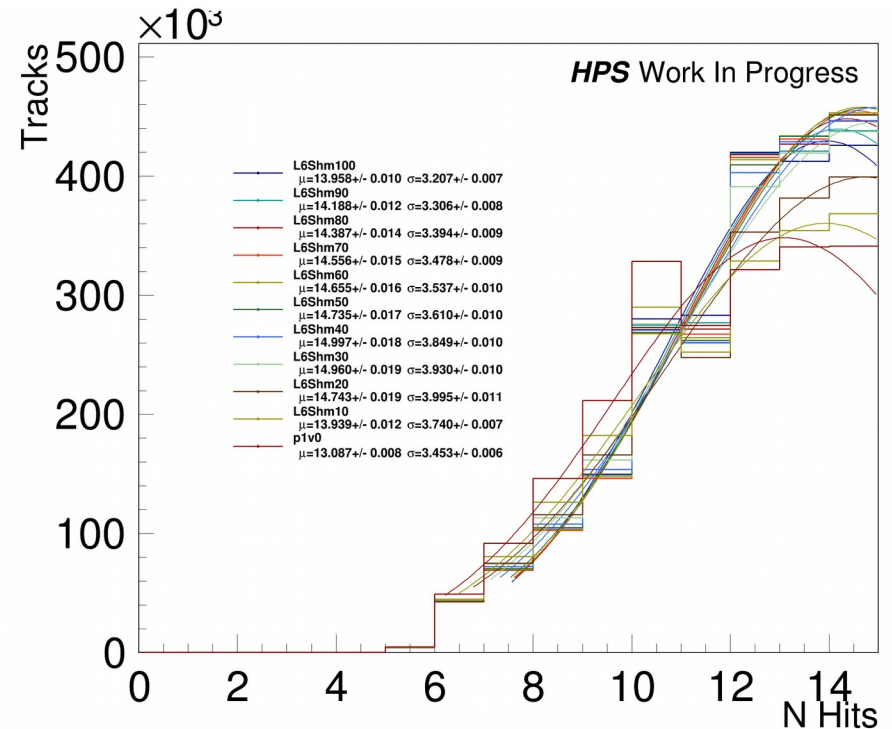
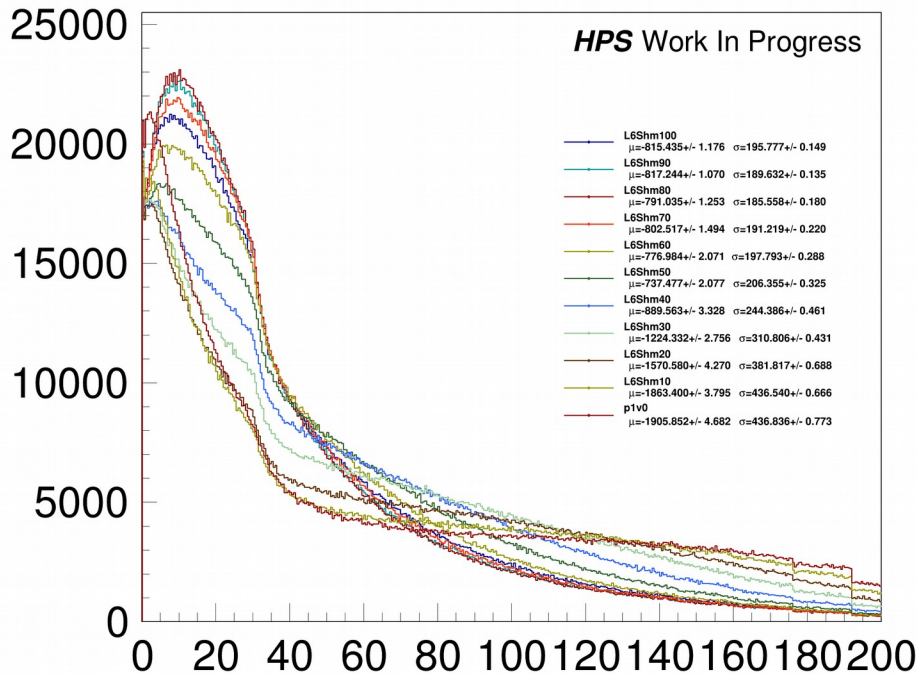


Determine which layer is misaligned



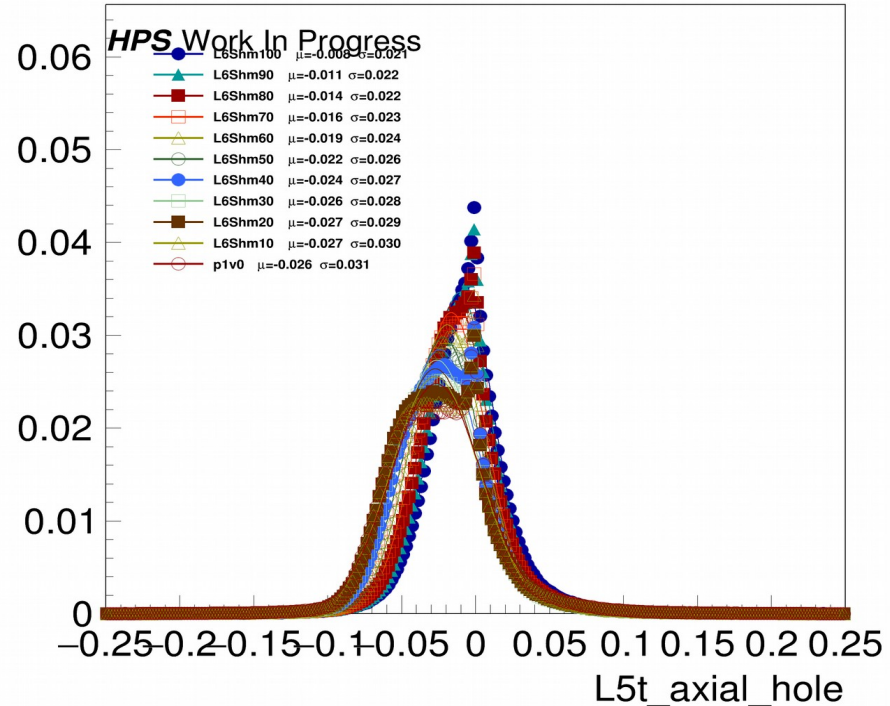
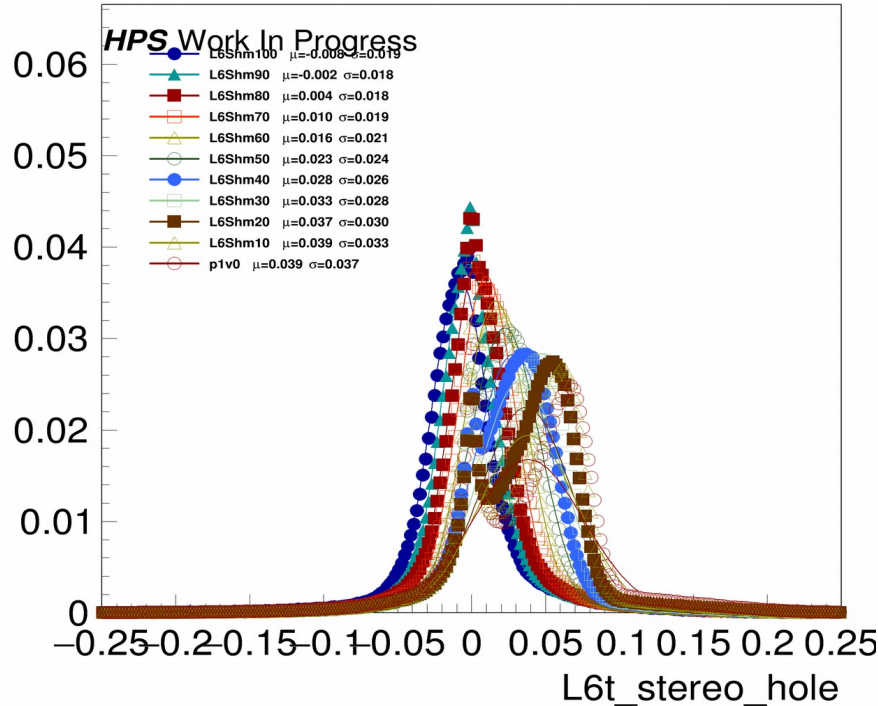
- Millipede does not fix this problem, it doesn't try to find missing hits
- Issue is x position of hits in layer 5 or 6 is way off, causing KF to sometimes miss the layer 7 hit and pulling the momentum down
- Systematically move layer 5 and 6 stereo sensors in Tu
- Move hits in x so KF doesn't miss the layer 7 hit
- Conclude here that it is layer 6 causing most of the issue, not layer 5

Determine how much to move Layer 6



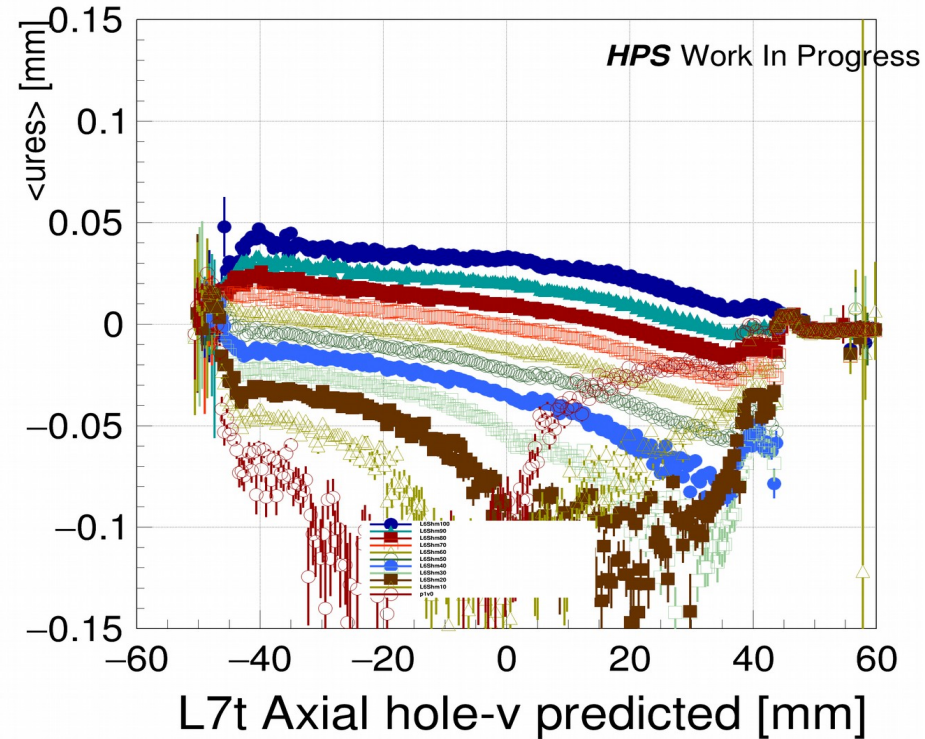
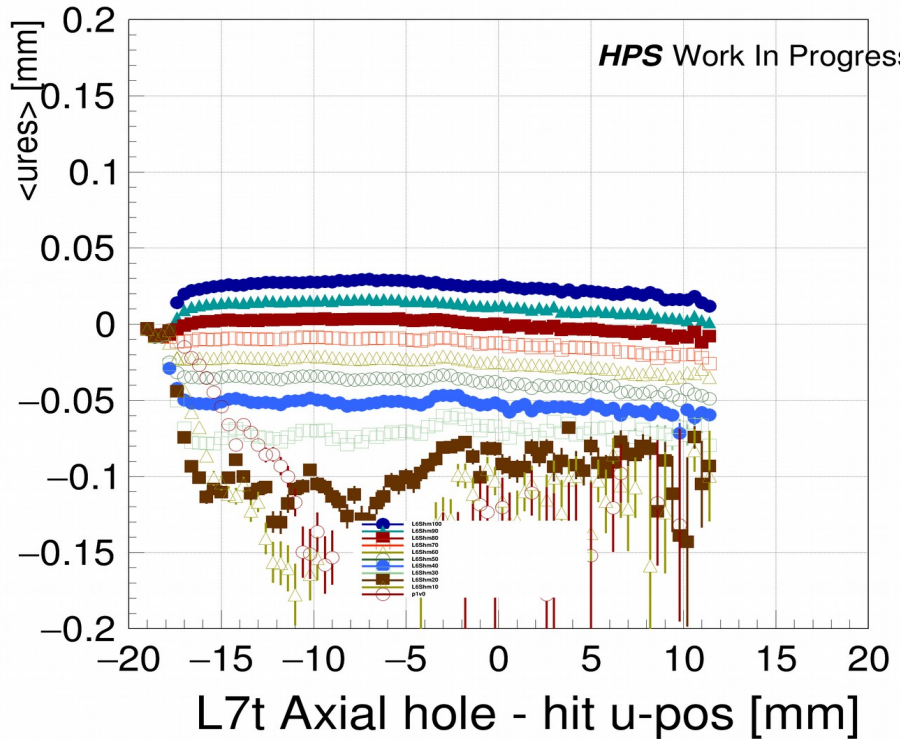
- See improvement to chi2 distribution as L6 top stereo hole is moved in negative direction
- Starts getting worse again after 80 um
- Chi2 shape has a “cut off” feature at high end of hump around 30

Determine how much to move Layer 6



- Large satellite peak in uresidual line up in both 5 and 6

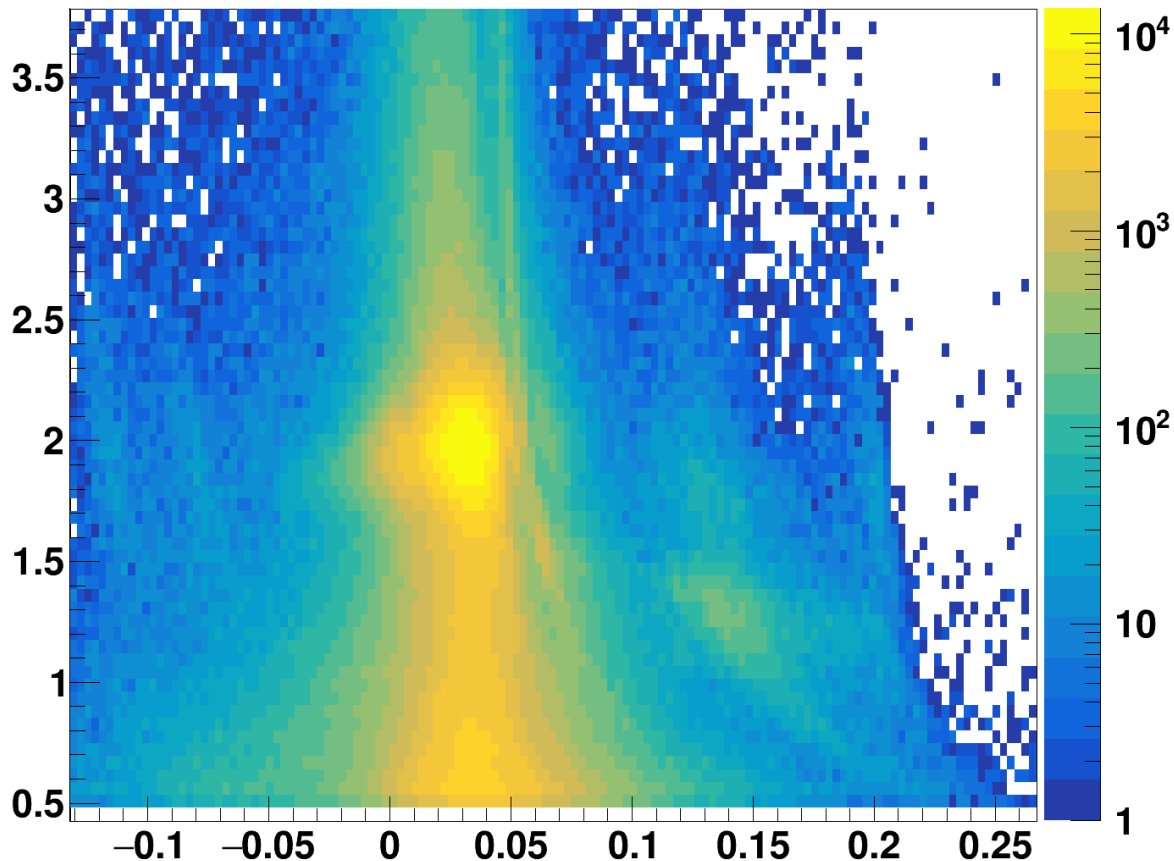
Determine how much to move Layer 6



- See significant improvement in residuals in layer 7
- Tracks have a layer 7 hit more often now with layer 6 aligned better
- Interesting we didn't see this issue in 3.74 GeV running

What is next?

p_vs_phi_top_neg



- Bifurcation in hole side is gone
- Run 2016 like procedure to further minimize chi2
- Slot side momentum scale of FEEs is low
- Starting to study which sensors need to move
- Bowing of layers 5-7?

- Need more effort cleaning up alignment software
- Different people are using different configurations, making it harder to follow each other
- Starting to get tools to run alignment software in hps-mc thanks to Tom!
- Sarah has tools for making nicer looking plots for comparing different detectors, we should all start to migrate
- Bowing of sensors “around” u direction is new idea to explain out-of-plane distortions we have evidence of
- Simply doing Tw does not fix everything, make it way better
- 2021 did not have any alignment information for layer 5-7 sensors, so much further off to start (lower N hits on track)