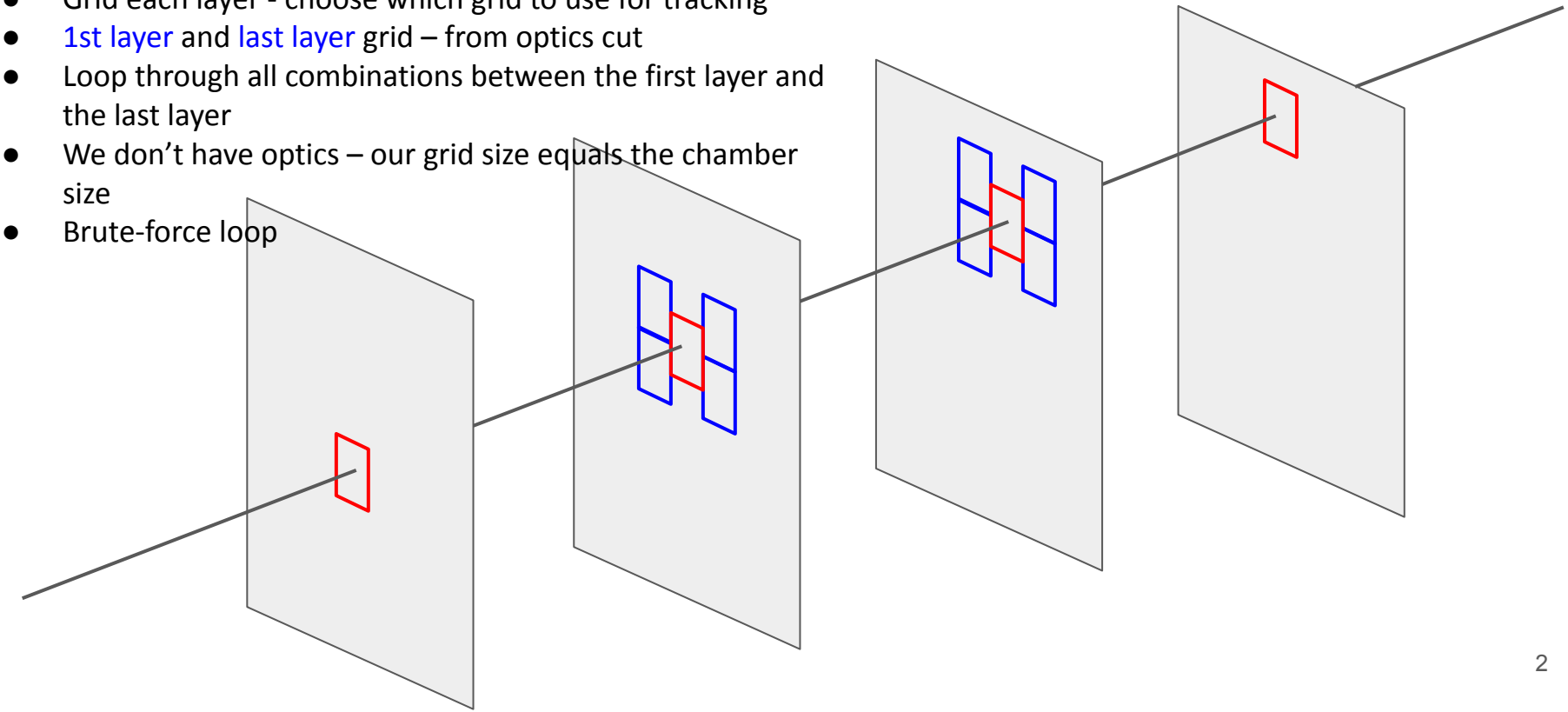
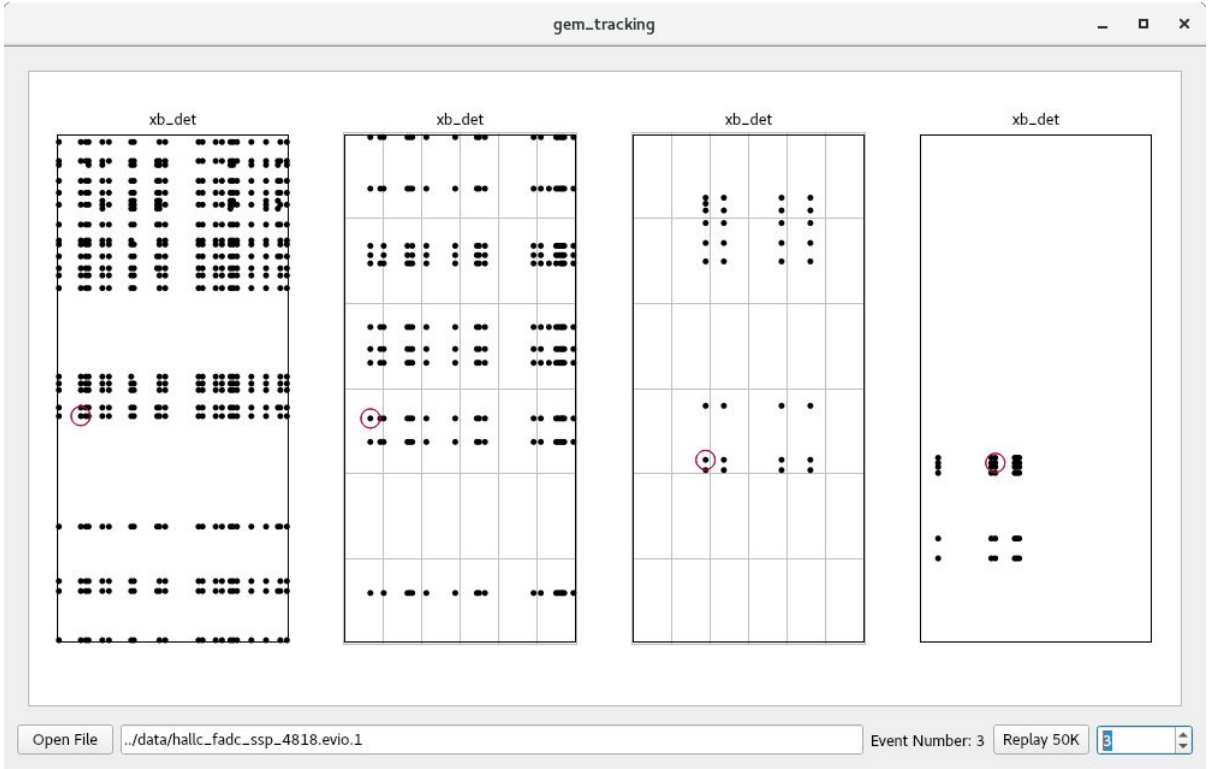
Tracking Optimization

Tracking Algorithm

- Grid each layer - choose which grid to use for tracking
- 1st layer and last layer grid – from optics cut
- Loop through all combinations between the first layer and the last layer
- We don’t have optics – our grid size equals the chamber size
- Brute-force loop



Grid - Speed

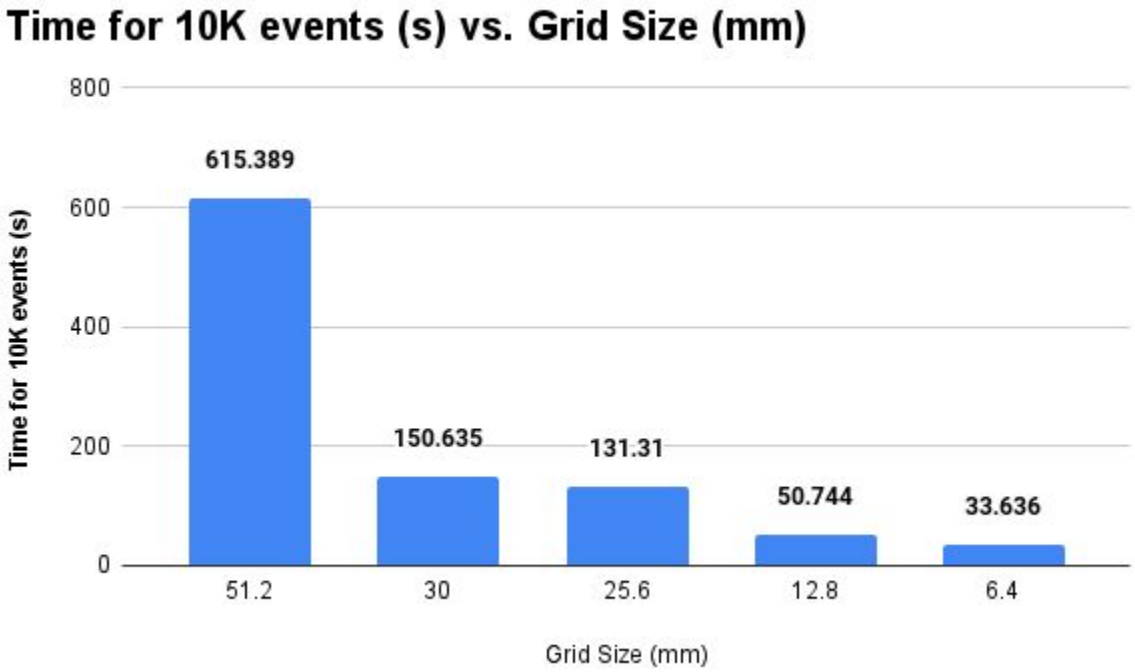


Smaller grids help on large occupancy events (run 4818):

- 128,064,159 track combinations for this particular event
- Grid size 102.4 mm (treat entire chamber as one grid) - 35.42 s
- Grid size 17.2 mm - 0.192 s

At present, grids only applied to middle layers - can apply to outer layers after optics implement

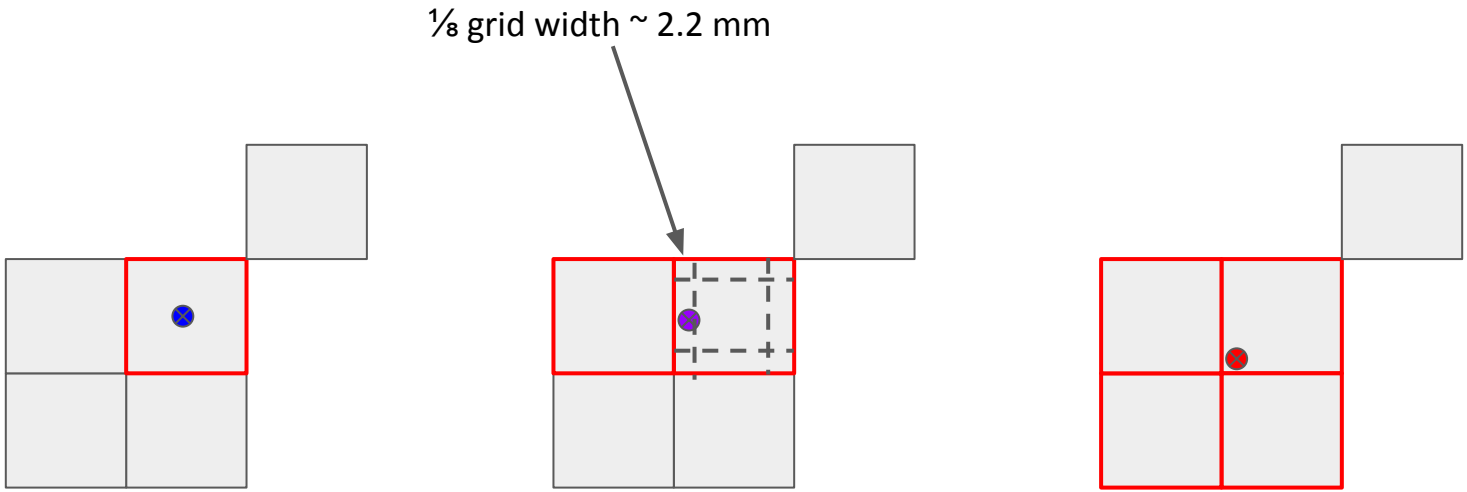
Grid Size - Speed



- This is based on the highest occupancy run (run 4818, 70 uA)
- Default grid size 17.2 mm (SBS-GEn 10 mm, with optics)
- every file split from high beam current runs (20GB file farm job) should be able to finish in 2 hours
- 7.6 seconds for 1000 events - run 4818

Multiple Grid Selection

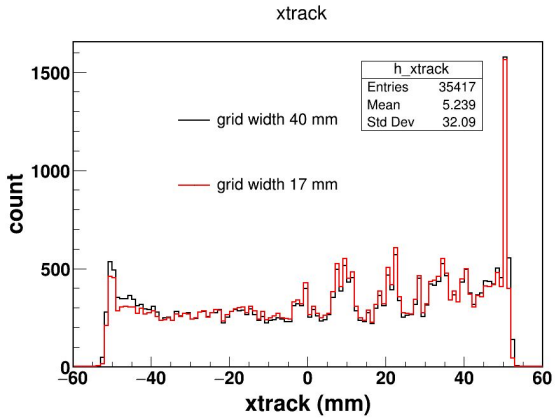
- Criteria for including neighboring grids - ⅛ grid width distance to grid edge

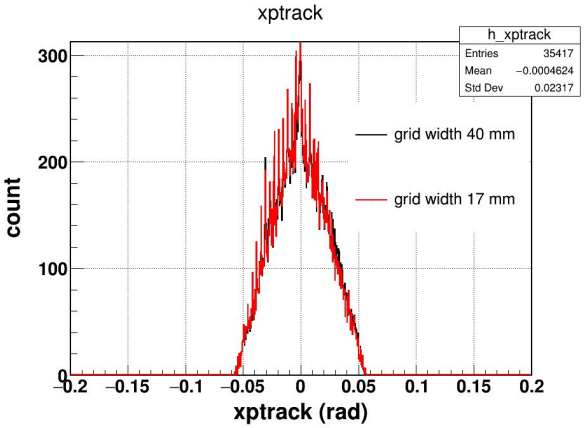


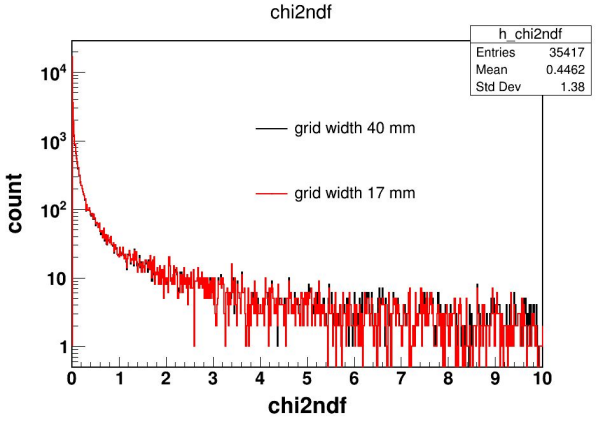
Results from different Grids - Run 4818

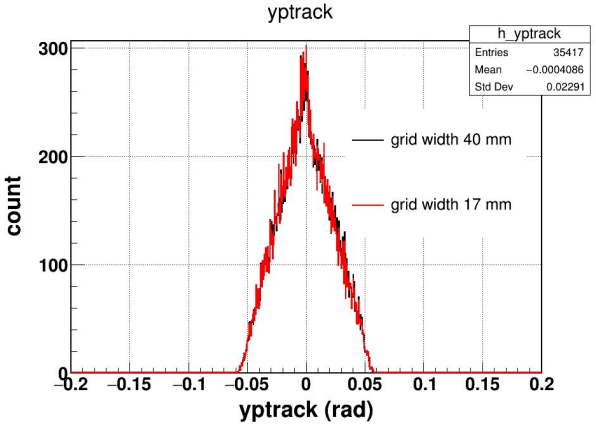
From 50K replay

- Chi2ndf distribution and xtrack distribution shows that we are still not finding the correct 2D clusters
- Next step would be to apply calorimeter cuts



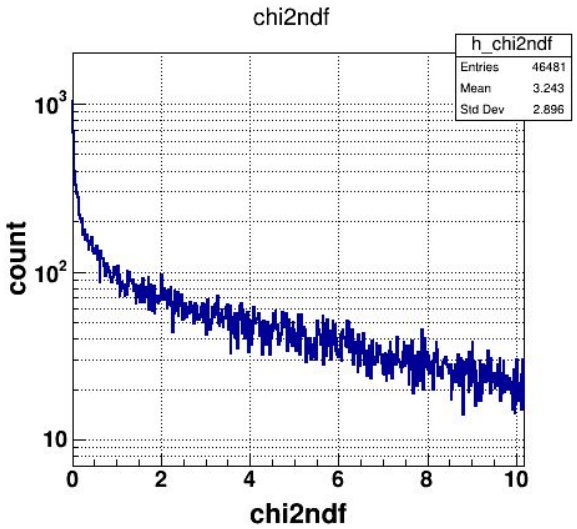


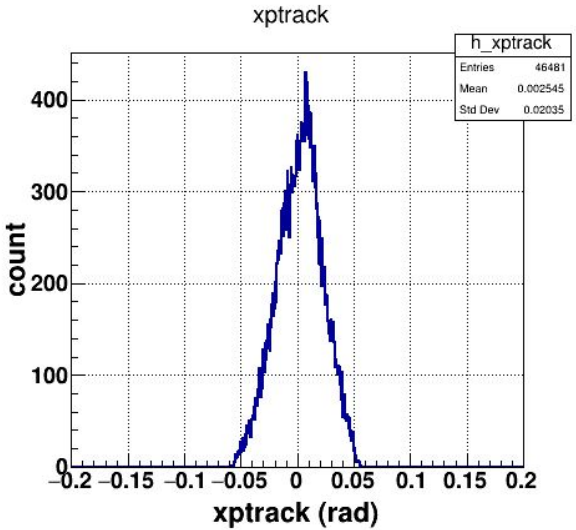


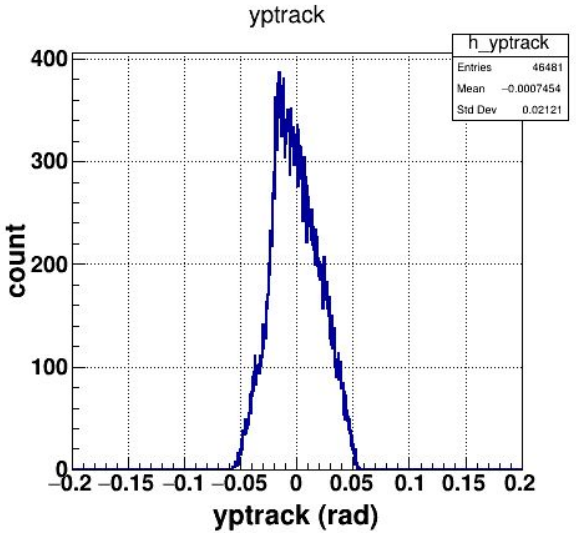


Track slope from run 4680 (5 uA)

- Low beam current run, low background particle hits



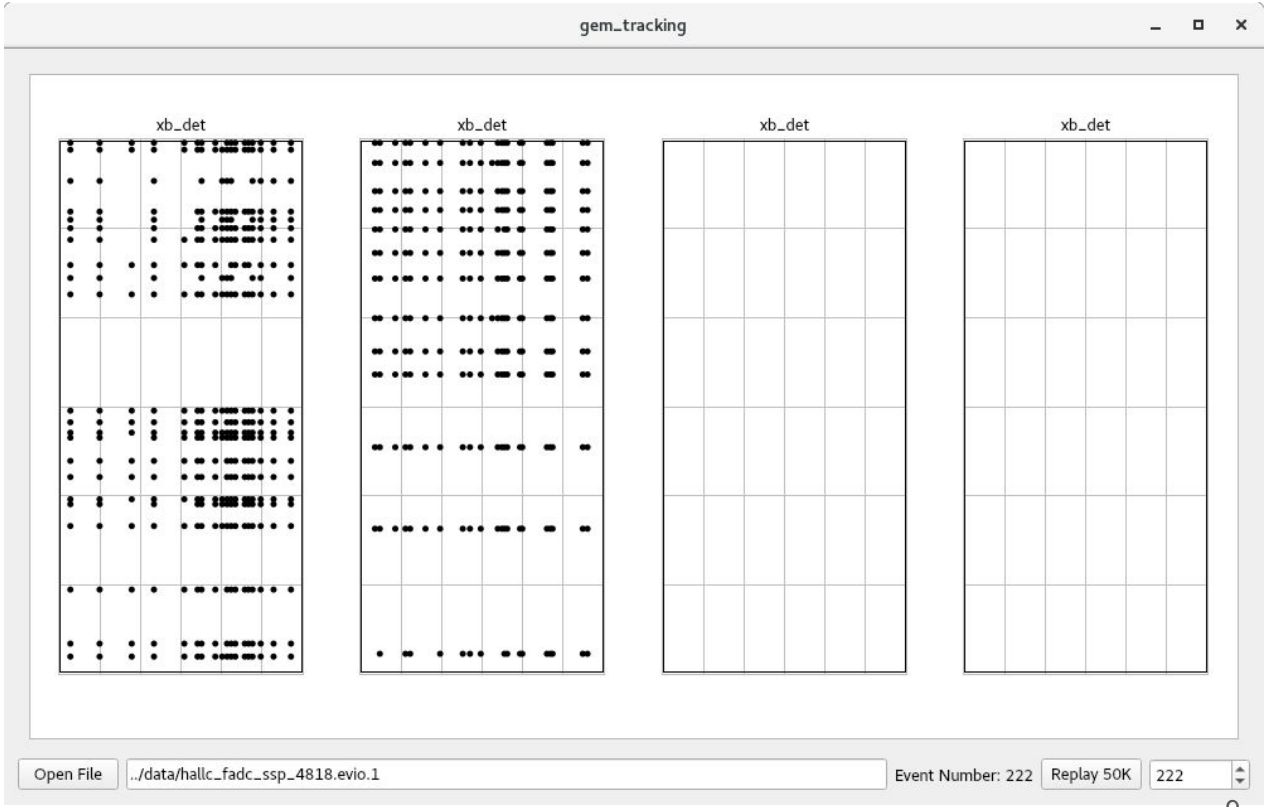




Backup Slides

Track Reconstruction Efficiency

- Removed hard chi2ndf cut
- as long as we have 3 chambers with hits, there will be at least one track (the one with minimum chi2ndf)
- Since the coverage for the 1st two chambers is much larger, so tracks per trigger depends on the last two chambers
- > 70% (relative to trigger) for high beam current runs - more fake tracks



One Hit track