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**U.S. DEPARTMENT OF
ENERGY**

Office of Science

Tracking Hits Check

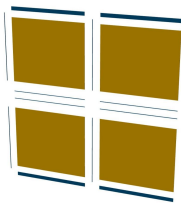
Shujie Li, Joe Xu

Aug 27, 2024

Check hits per track

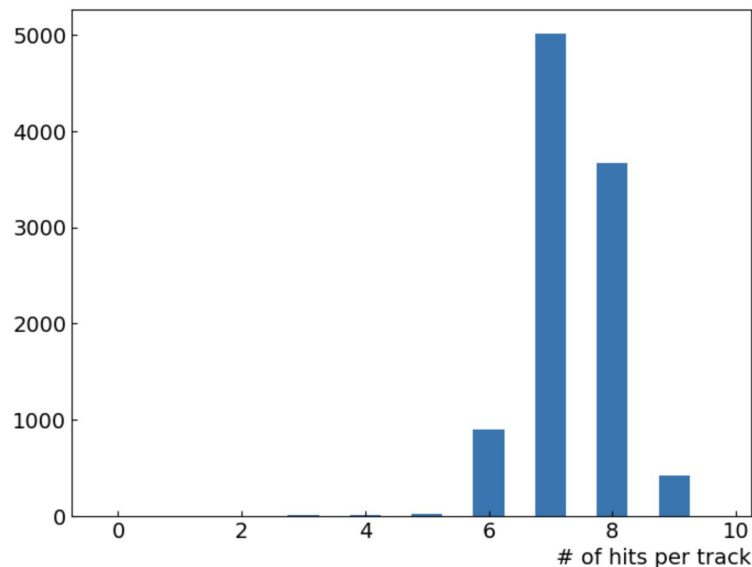
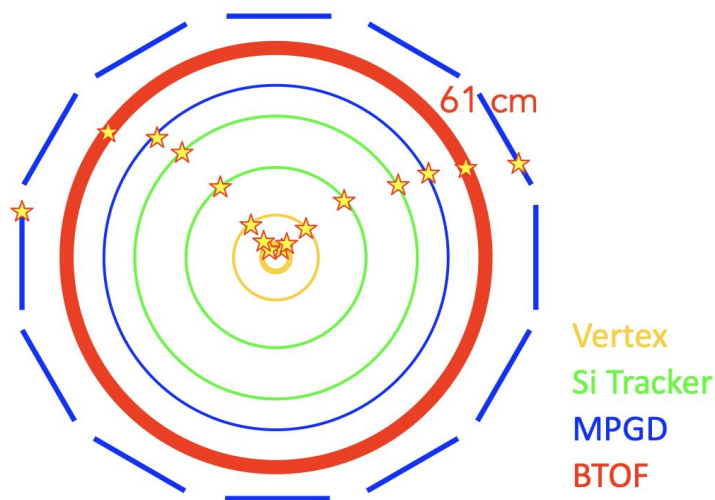
can extend this to the disk region

- event sample: 10k single π^+ , central region, 100 GeV with eic-shell version 24.08, standard ePIC geometry



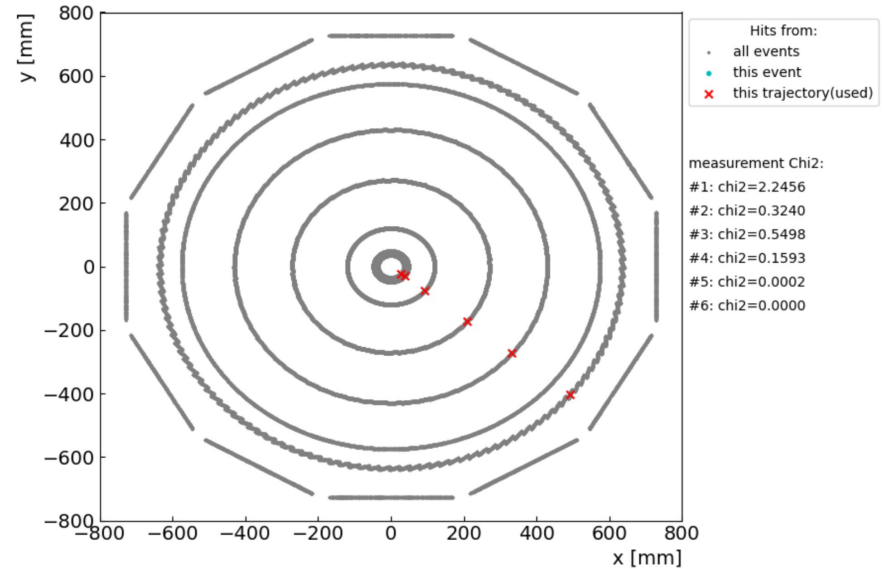
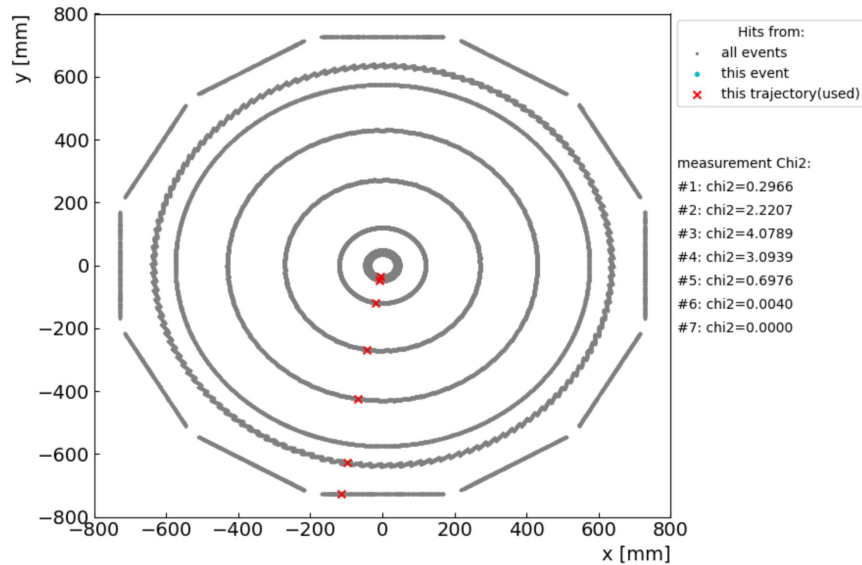
motivation: use the # of hits to study the tracker acceptance impact (inactive Si area, disk opening etc)

- As a baseline, the standard (no inactive area) central tracker should provide 8 hits



Missing hits

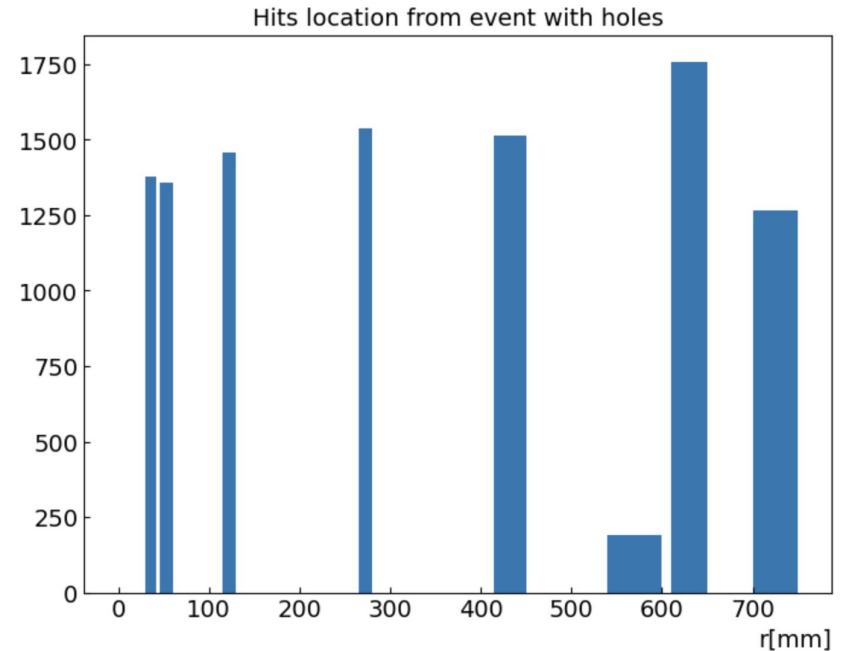
- holes only counts the discontinuity of track, not end points



Missing hits

- >10% events have no raw hits on inner MPGD
 - issue communicated with Matt Posik
 - outer MPGD is known to have acceptance gap.

Hit collection	Rmin [mm]	Rmax [mm]	# of event with hits
SiBarrelVertexRecHits	30	42	10000
SiBarrelVertexRecHits	46	60	10000
SiBarrelVertexRecHits	115	130	10000
SiBarrelTrackerRecHits	265	280	10000
SiBarrelTrackerRecHits	415	450	10000
MPGDBarrelRecHits	540	600	8424
TOFBarrelHits	610	650	10000
OuterMPGDBarrelRecHits	700	750	6987



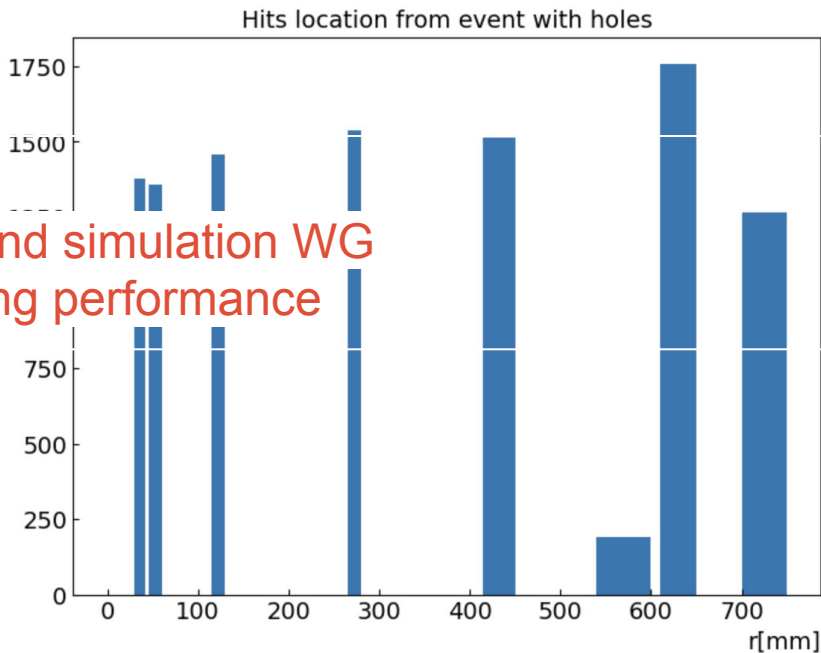
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SiBarrelVertexRecHi			
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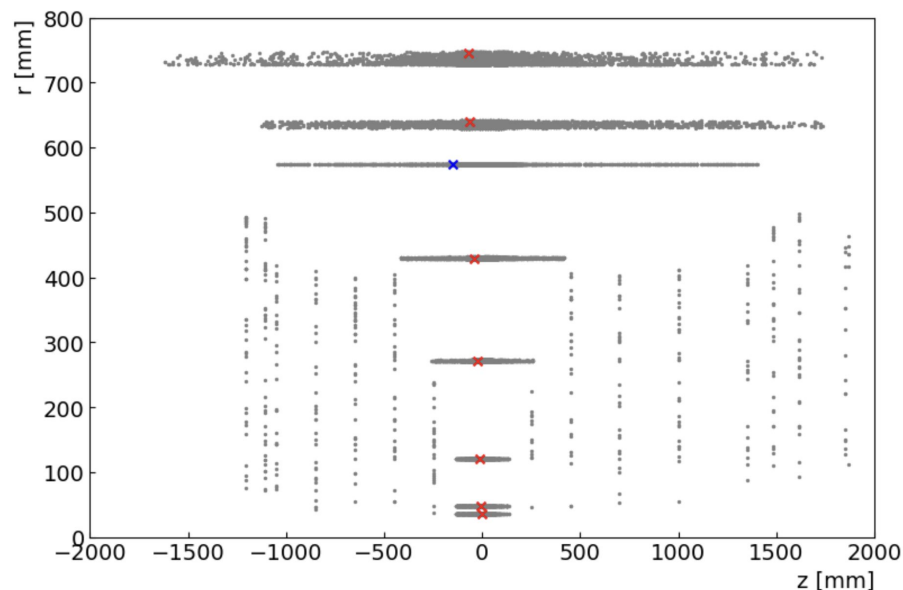
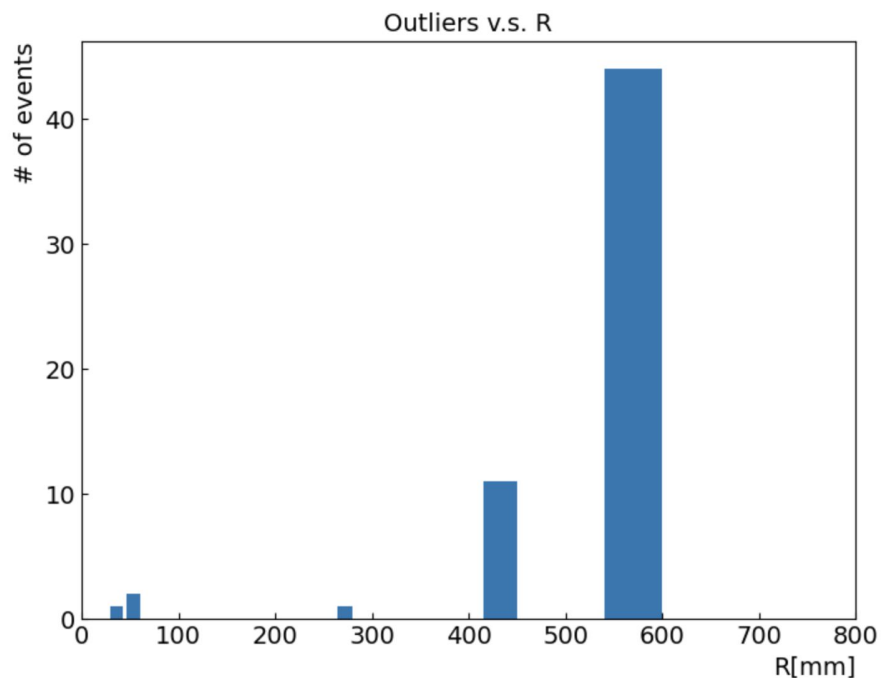
to do:

- will follow up with MPGD and simulation WG
- check the impact on tracking performance



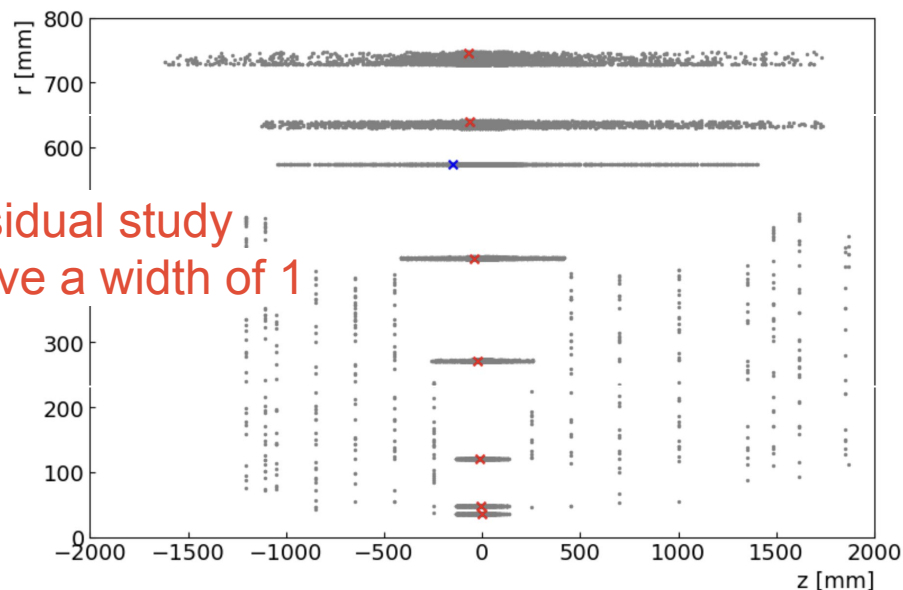
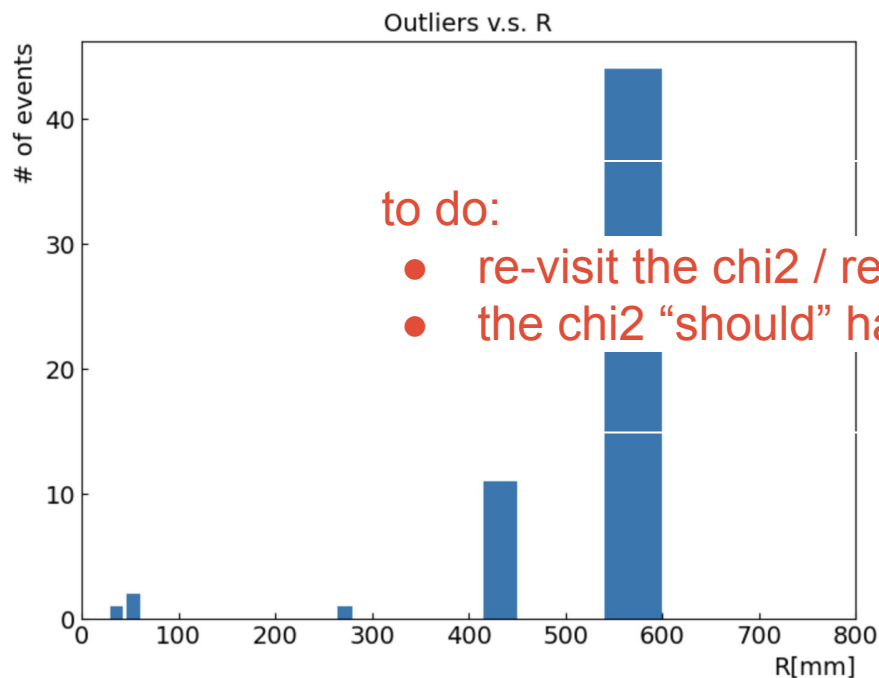
Outliers

- mostly on MPGD:
 - per Wouter: for slanted tracks through the 3mm thick MPGD layers there is a non-negligible chance that there is a geant4 step that ends in the middle of the gas volume. That leads to two tracker hits then and each is going to be a bit displaced from the actual location of the center plane crossing.



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Multiple Hits on One Detector Layer

- occurs on Si outer barrels and TOF:
 - both detectors are implemented as tilt staves with overlap areas.

