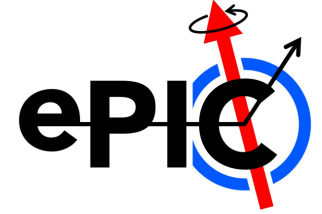


ePIC BHCal Simulation Status

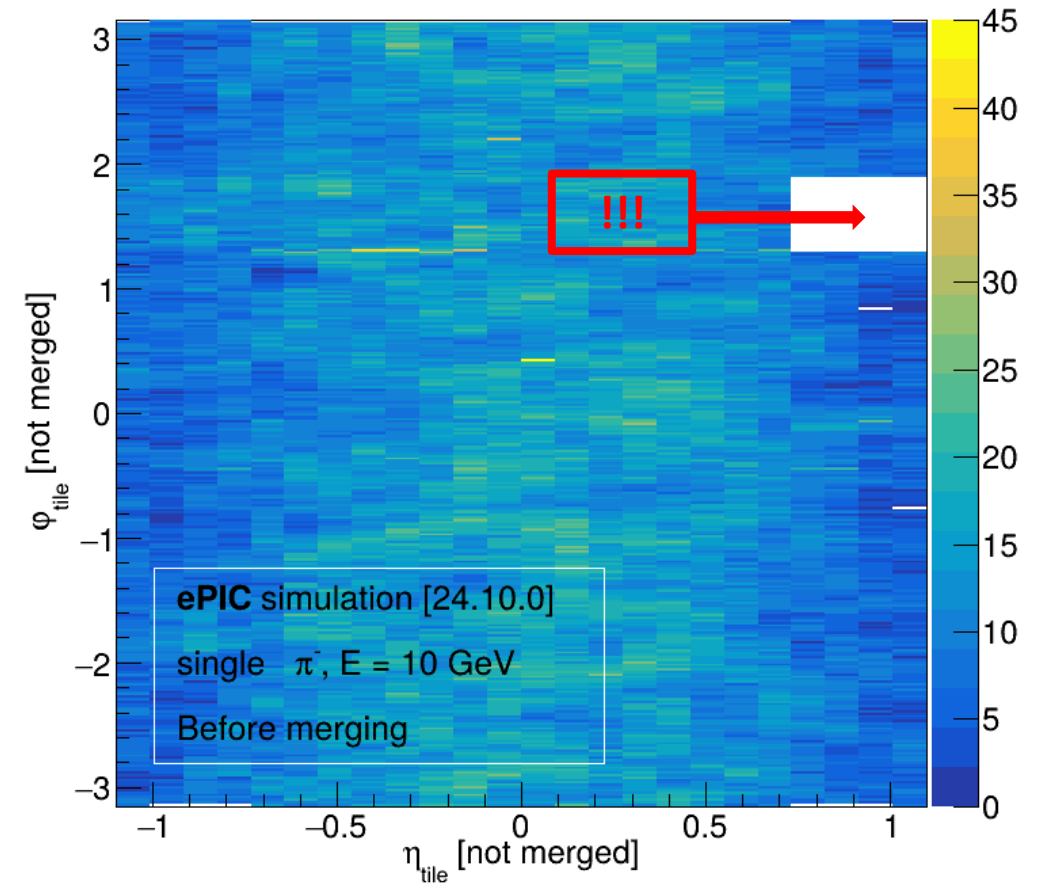
Derek Anderson

02.14.2025

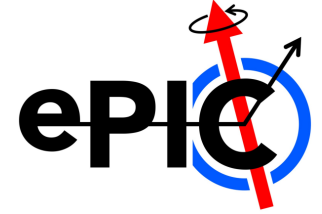
The Hole Mystery | context



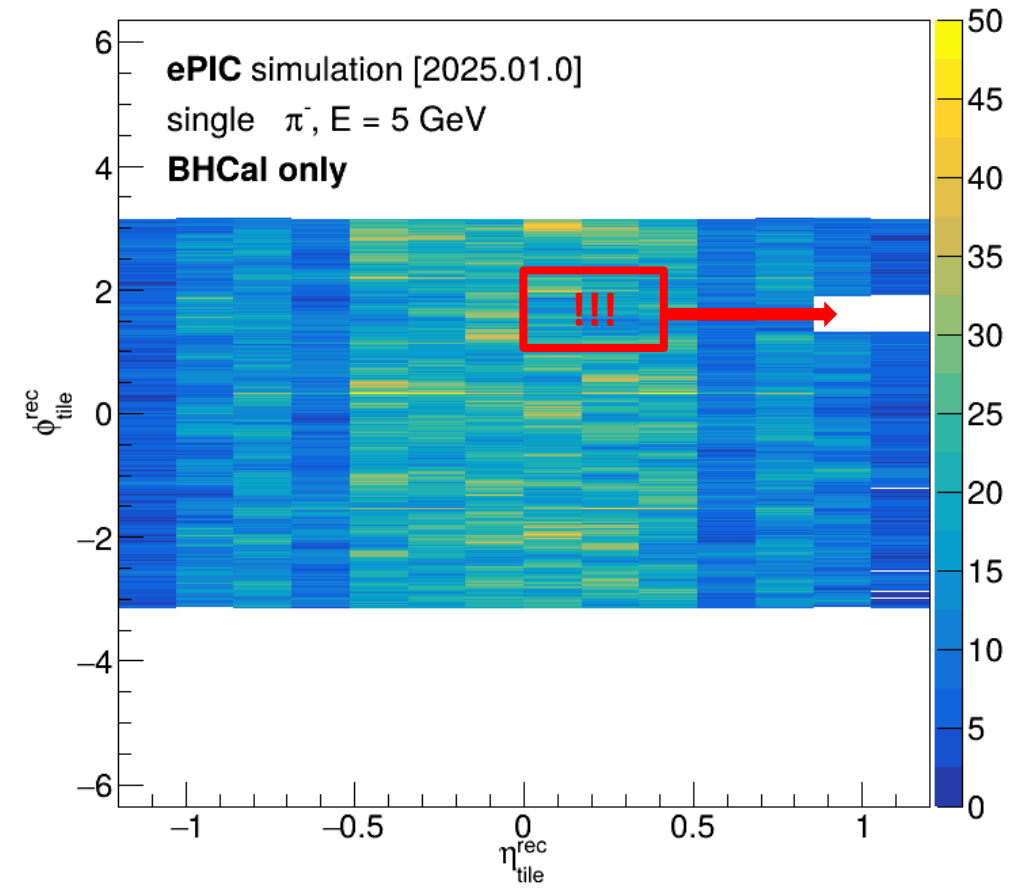
- **Late last year:** noticed a mysterious hole had appeared in our acceptance
 - *Definitely* was not there in 2023...
 - And wasn't clear if it corresponding to a specific feature
 - ☞ e.g. *definitely* not the chimney sector
- **Right:** eta/phi of tiles from 2024.10.0 geometry
 - Single 10 GeV π^- events



The Hole Mystery | check 0: can I reproduce it?



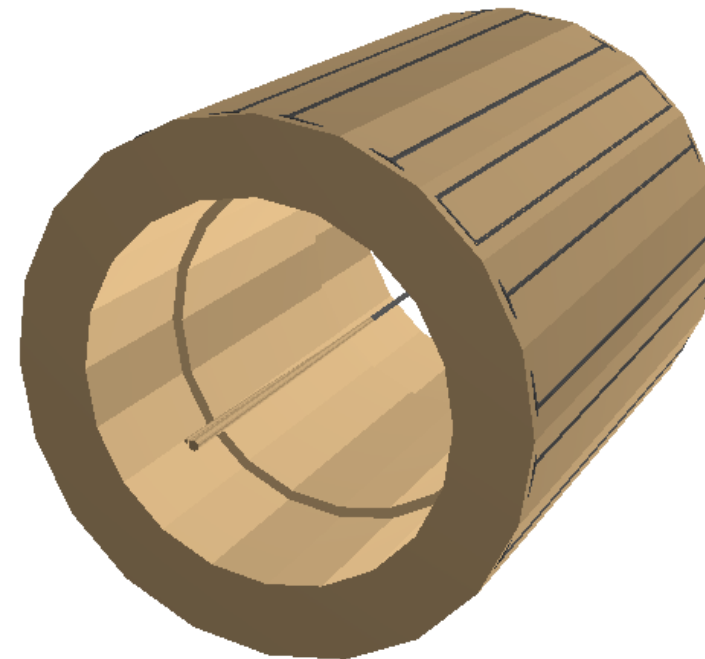
- As a 0th order check, wanted to confirm that it was still present in the latest geometry
 - **It is**
- **Right:** eta/phi of tiles from **2025.01.0** geometry
 - “BHCAL-only” configuration
 - › i.e. BHCAL + beampipe
 - › **epic_bhcal.xml**
 - Single 5 GeV pi- events
 - **Note:** tiles are *reconstructed*, so after digitization + thresholds have been applied
 - ☞ Hole is *also* seen for sim hits



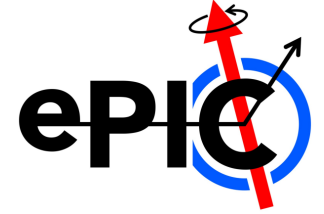
The Hole Mystery | check 1: how does the geom look?



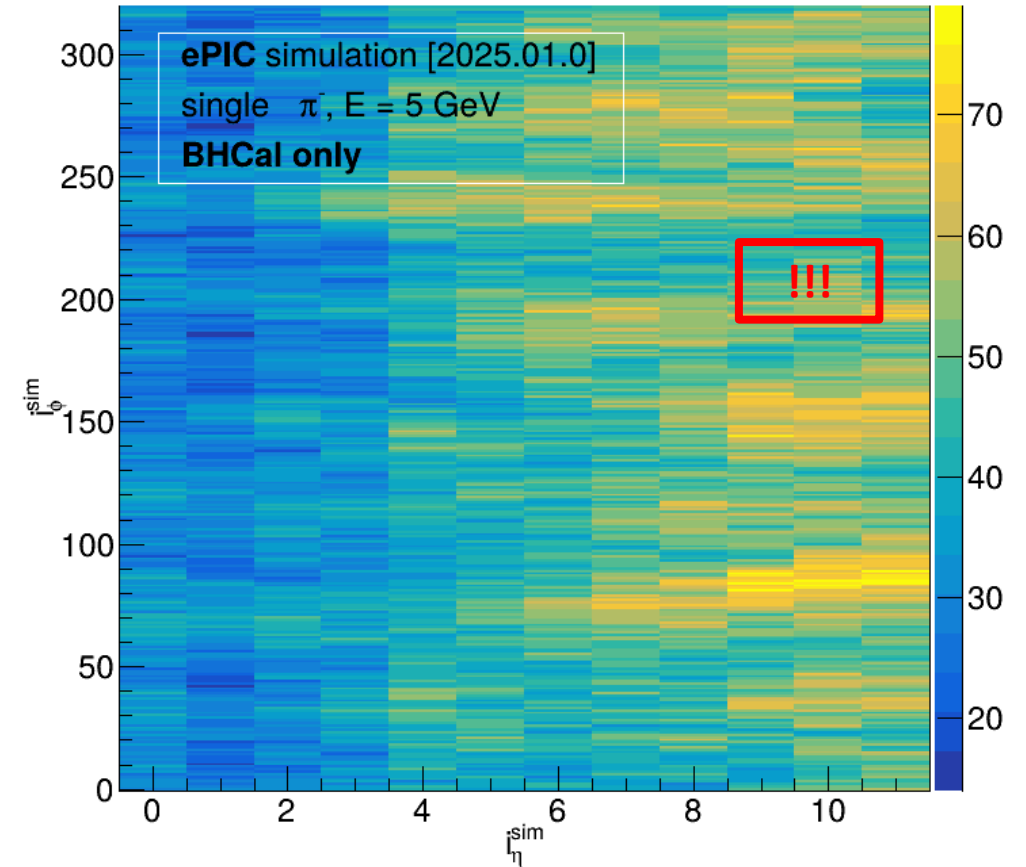
- Quick check: exported 2025.01.0 geometry to see if anything was *immediately* apparent
 - **Not really**
- **Right:** exported BHCAL-only 2025.01.0 geometry



The Hole Mystery | check 2: do we hit all indices?



- Next, wanted to check to see hit every possible eta/phi index of the tiles
 - **We do!**
 - ☞ If some aren't being placed (or etc.), then we should also see a hole in *this* distribution
- **Right:** eta/phi *index* of tiles from **2025.01.0** geometry
 - Same configuration, single 5 GeV pi- events
 - **Note:** tiles are *simulated*, so these correspond to the sum of G4hits



The Hole Mystery | check 3: eta/phi of hole tiles?

- Lastly, we know what the indices of the hole should be roughly $ieta = 10 - 11$, $iphi = 226 \sim 256$
 - ☞ **And we know that all indices are being hit, so what are the hole tiles' eta/phi?**
 - **Right:** eta/phi of sim tiles w/ eta/phi indices in above range from **2025.01.0** geometry
 - **Looks like they just haven't been translated from the origin!**
 - Same configuration, single 5 GeV π^- events
- **Next steps:** should be fairly easy fix, so will open an issue on GitHub and go from there

