Tracking report of the EPIC simulation production

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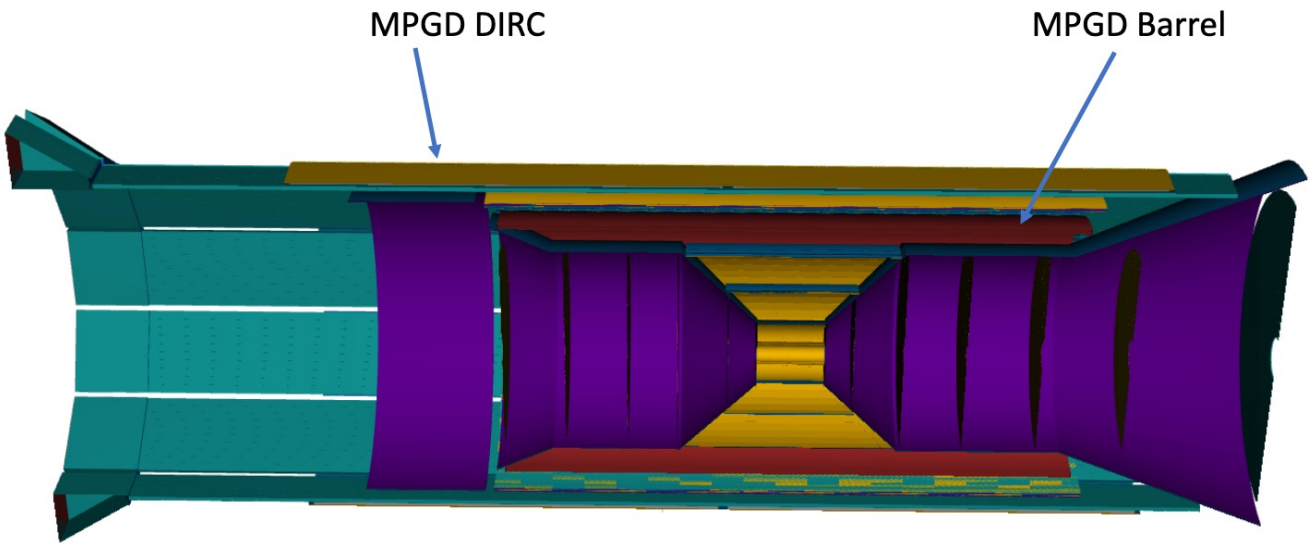
on behalf of the EPIC Tracking Working Group

EPIC vertex and tracking detector geometry check



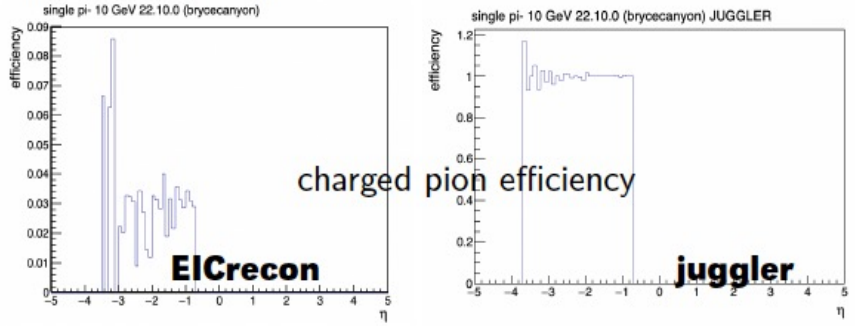
- Geometry checked performed by Shujie Li (MAPS vertex and tracking detector), Matt Posik (MPGD tracking detector), Nicolas Schmidt (AC-LGAD ToF). Converged on the detector geometry, see details in https://indico.bnl.gov/event/17349/
- New EPIC magnet field map checked by Rey Torres and Wenqing Fan, found the new EPIC field map has some issues, which may due to the wrong unit. Elke will help on the fix.

Issue found so far for the 22.10/11 simulation campaign

- Report by Nicolas Schmidt in https://indico.bnl.gov/event/17349/contributions/70681/attachments/44412/74947/2022_11_ElCrecon_Status.pdf

- Two outputs available for single particle productions (juggler and eicrecon)
- Files can be found on S3 (`eictest / EPIC / RECO / 22.10.0`)
  → `https://dtn01.sdcc.bnl.gov:9001/buckets/eictest` via eicS3read (user+pw)
- Some issues observed:
  - **Missing fraction of MPGD hits** due to ddsim minimum energy cut of 1keV on all detectors
    → no fix available yet
  - **Nearly no tracks available in eicrecon** output (e.g. 350 tracks in 150k events)
    → juggler output unaffected (see plots)
    → tracking factory failed due to SurfaceErrors in ACTS and was then excluded from further event processing
    → Problem described e.g. in ElCrecon #306
    → **Fix available now and merged, see ElCrecon #326**
  - **Missing ReconstructedParticles branch in DIS outputs** (22.11 campaign)
    → to be fixed after SimQA meeting today

Single particle eicrecon outputs not usable for tracking studies at the moment. Use juggler output until new eicrecon outputs are available.



Tracking WG plan

- Will report the tracking performance in later meetings.
- Will evaluate the tracking performance with different magnetic field maps (Wenqing Fan).
- Look into two different service routine options (one service cone or two service cone) to reduce the material budgets in front of active detector volume. The one service cone option need further detector geometry changes/optimizations and will report to the GD&I WG and keep the Sim/QA/Com WG in the loop.
- Require EIC background simulation for track pattern recognition and any detector geometry optimization (more layers/disks)?