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LBNL local EIC mtg.
April 19, 2022

Proposed ECCE Tracker – now reference for Detector 1

(ECCE proposal)

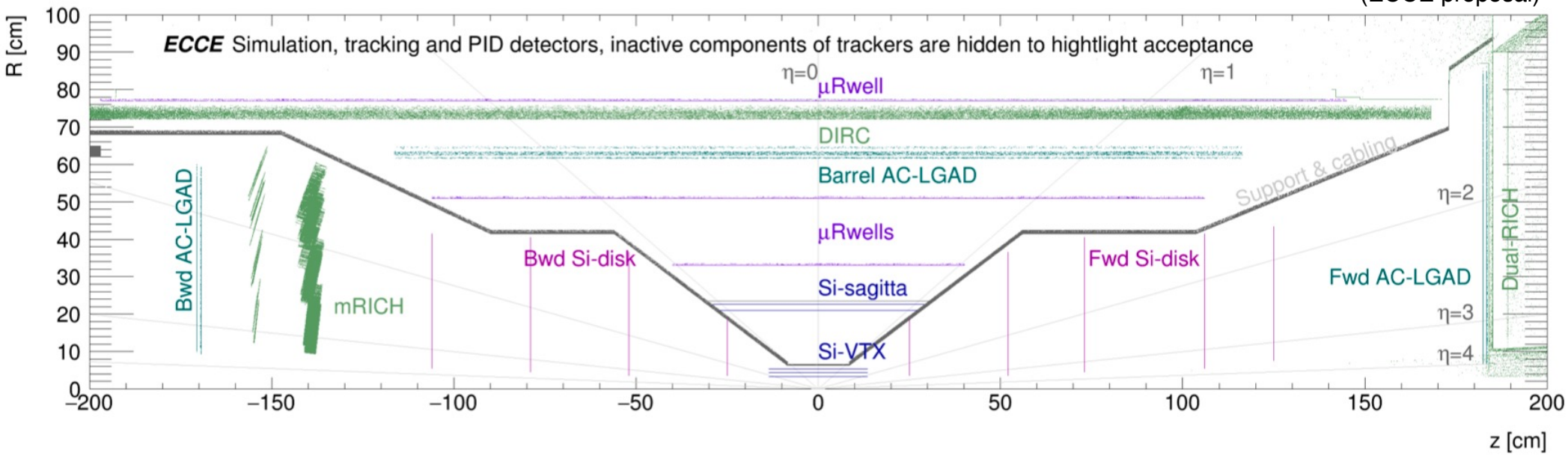


Figure 2.5: Schematic view of the ECCE tracker, including silicon, μRWELL, AC-LGAD, DIRC, mRICH and dRICH detector systems.

- Lots of commonality with the ATHENA proposal, most notably on sensors and aspects of layout,
- I found it surprisingly hard so far to get sufficiently detailed information from the proposal or articles-in-preparation,
- In view of the DPAP recommendation, now, value in (re-)visiting this tracker in fast / full simulations.

Proposed ECCE Tracker dp/p Performance

(ECCE proposal)

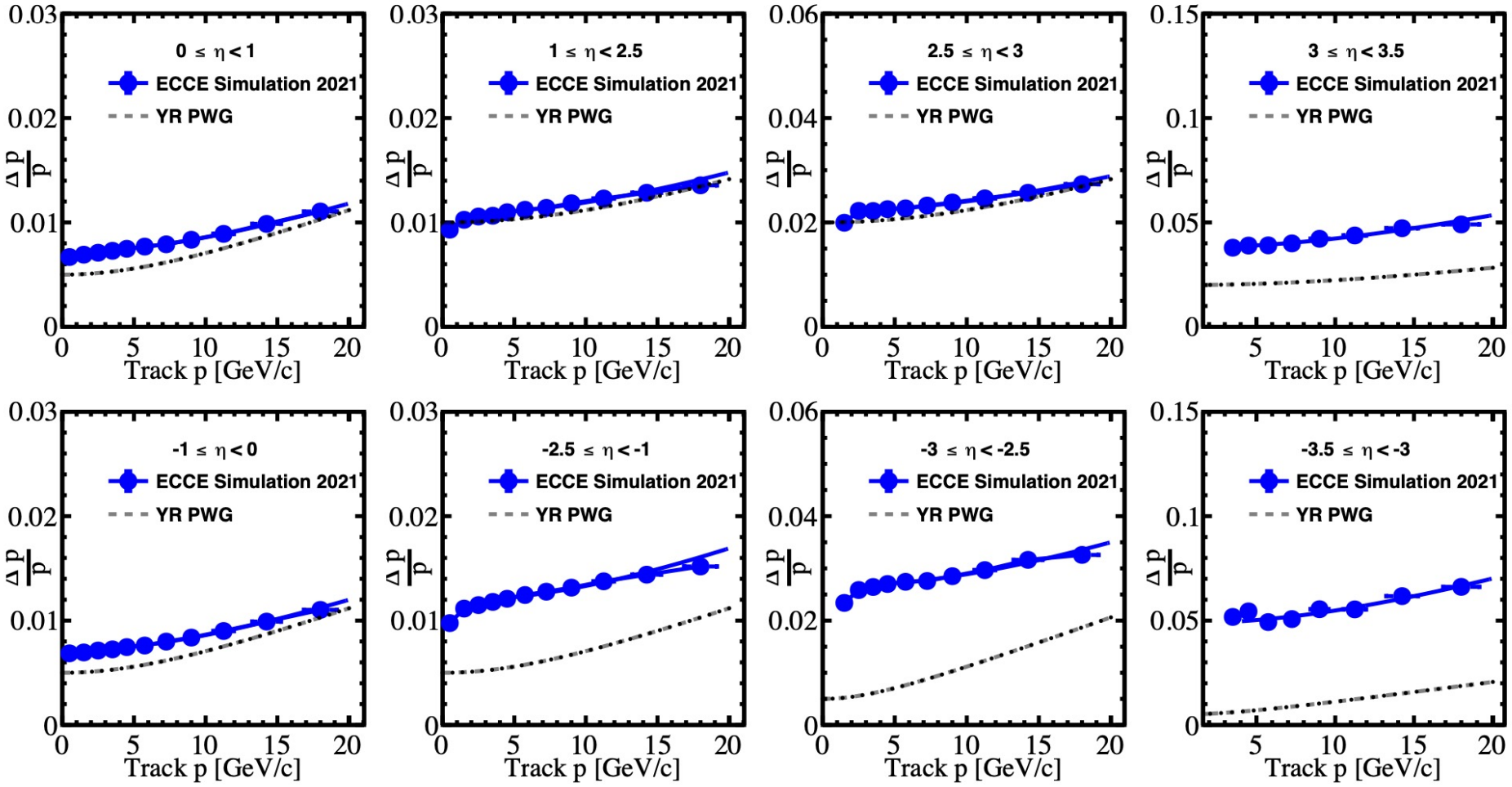
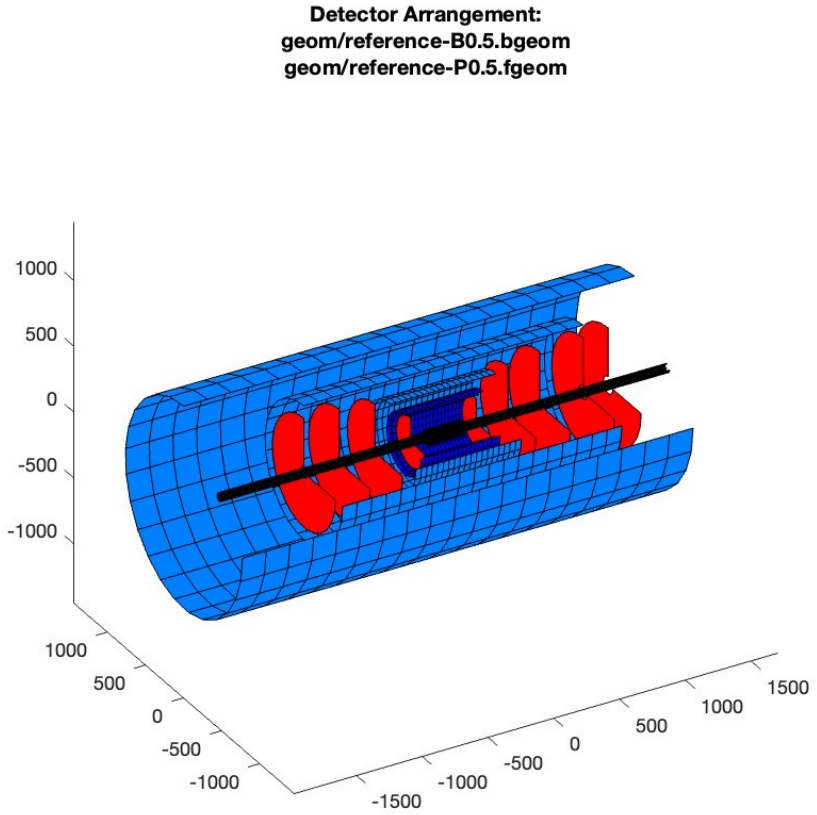
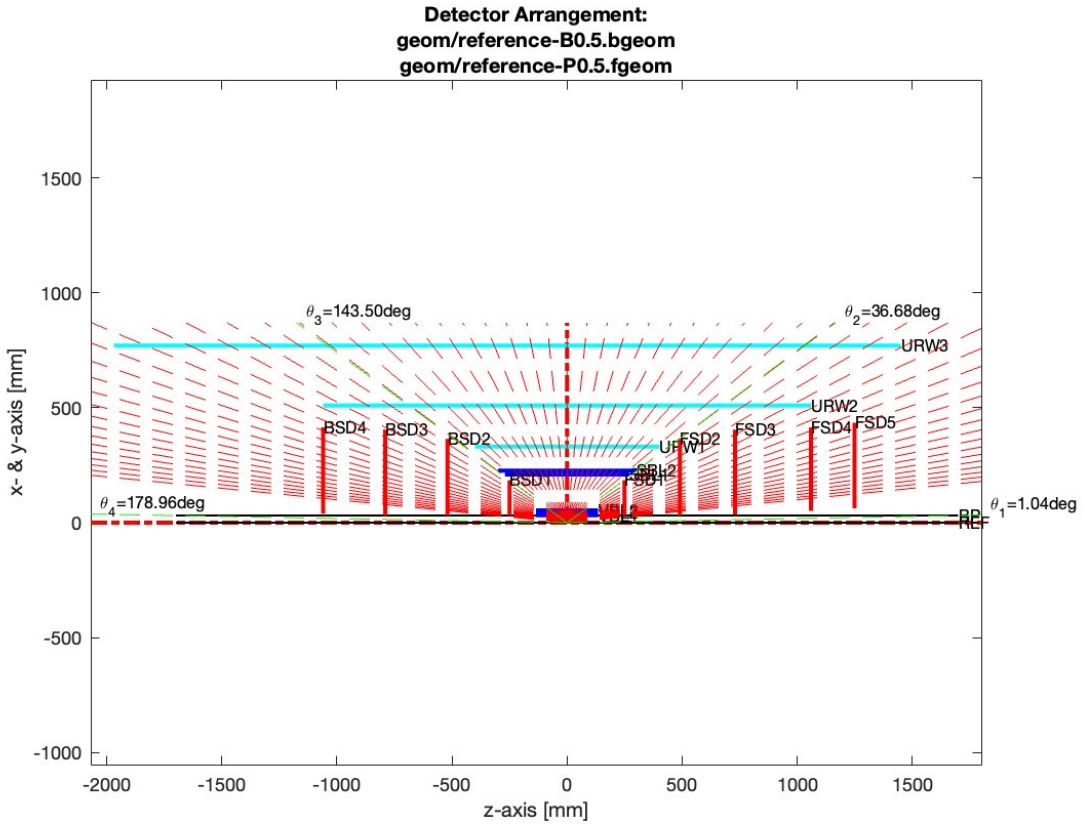


Figure 2.7: ECCE pion track momentum resolution (data points) with the EIC YR PWG requirements for the tracker indicated by the dashed lines. Note that the ECCE performance simulations take into account materials for readout and services. The impact of these can be observed most clearly in the bins covering the barrel/barrel endcap transition regions. As an integrated EIC detector with all subsystems operating in a complementary way, ECCE achieves the EIC physics goals as described in Chapter 3.

- The ECCE tracker, as proposed, meets the YR goals... where?
- If $X/X_0 = 0.05\%$ is indeed assumed for the sagitta layers, even the mid-rapidity region will benefit from revisiting for performance,
- Some gains can likely be had in the disk arrays; they simply do not look optimal to me,
- Differences from 1.5 vs 3.0 T and lever arms will not be recovered.
- (In-)sufficiency of hit points remains an open question.

Towards a fast simulation of the detector 1 reference (ECCE)

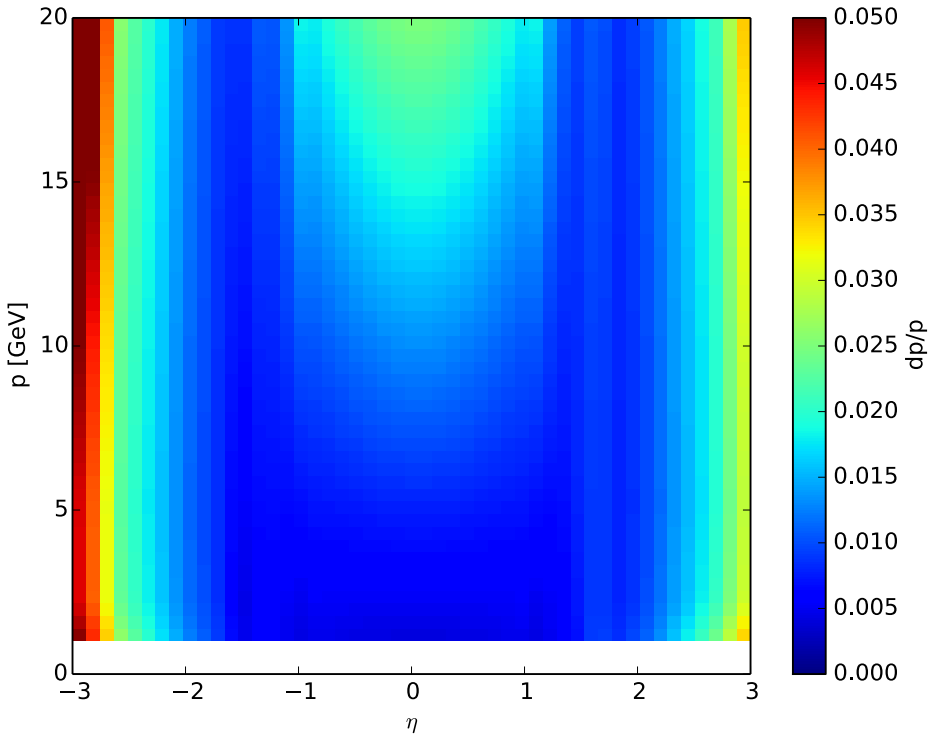




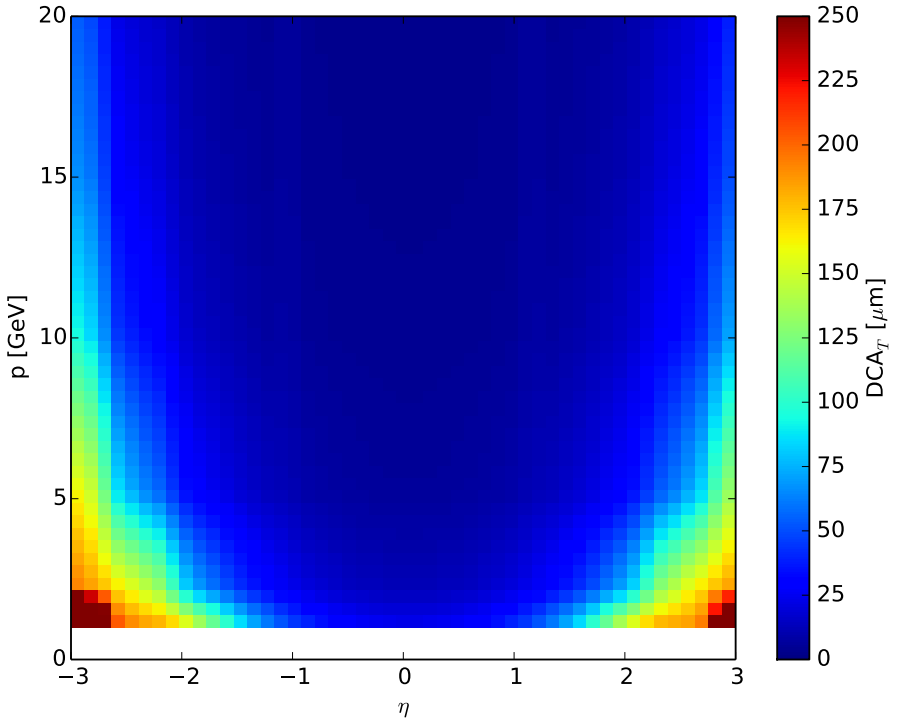
- Still an early implementation, focused on MAPS (barrel and disks), barrel AC-LGAD, and uRWELL
- Forward/backward AC-LGAD missing here; in progress (details…)

Towards a fast simulation of the detector 1 reference (ECCE)

Relative momentum resolution



Transverse DCA resolution



- Early (= pre-prelimary) performance from fast simulations,
- High-momentum mid-rapidity dp/p performance is worse than in the proposal; likely because of uRWELL resolutions,
- dp/p in the forward and backward regions appear in reasonable agreement,
- DCA-T appears in reasonable agreement (not too surprising),
- Preparing for fast-simulation studies e.g. of material thickness in Sagitta layers and disks, lever arms (!), etc.