ECCE Silicon Vertex/Tracking Conceptual Design Introduction

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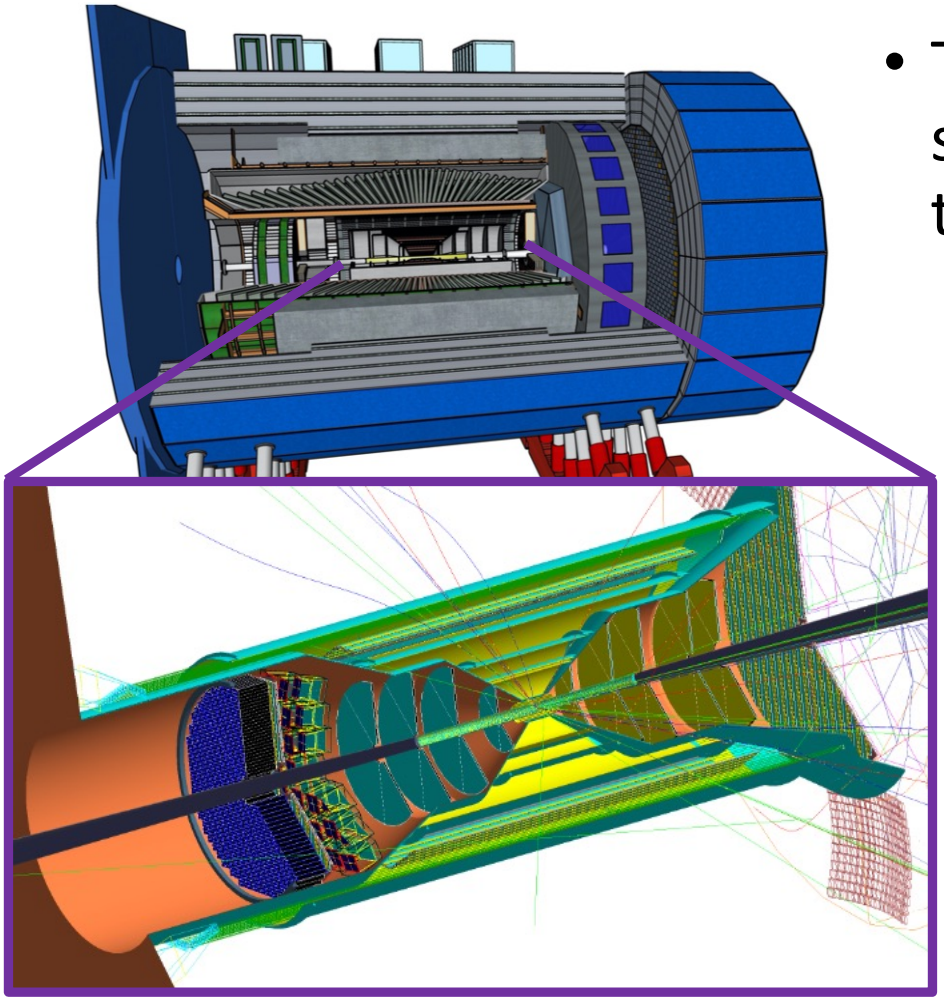
ECCE tracking reference concept

- The ECCE tracking detector consists of integrated MAPS, μRwell and AC-LGAD tracking detectors.



- The ECCE silicon tracking systems is based on the ITS-3 type MAPS technology:
  - Barrel subsystem consists of 3 silicon vertex layers and 2 sagitta middle layers utilizing the design from the EIC silicon consortium. Pixel size: 10 μm
  - Hadron endcap consists of 5 disks. Pixel size: 10 μm.
  - Electron endcap consists of 4 disks. Pixel size: 10 μm.

ECCE silicon vertex/tracking detector geometry

- Detailed detector geometries have been posted in the Fun4All ECCE associated repositories.

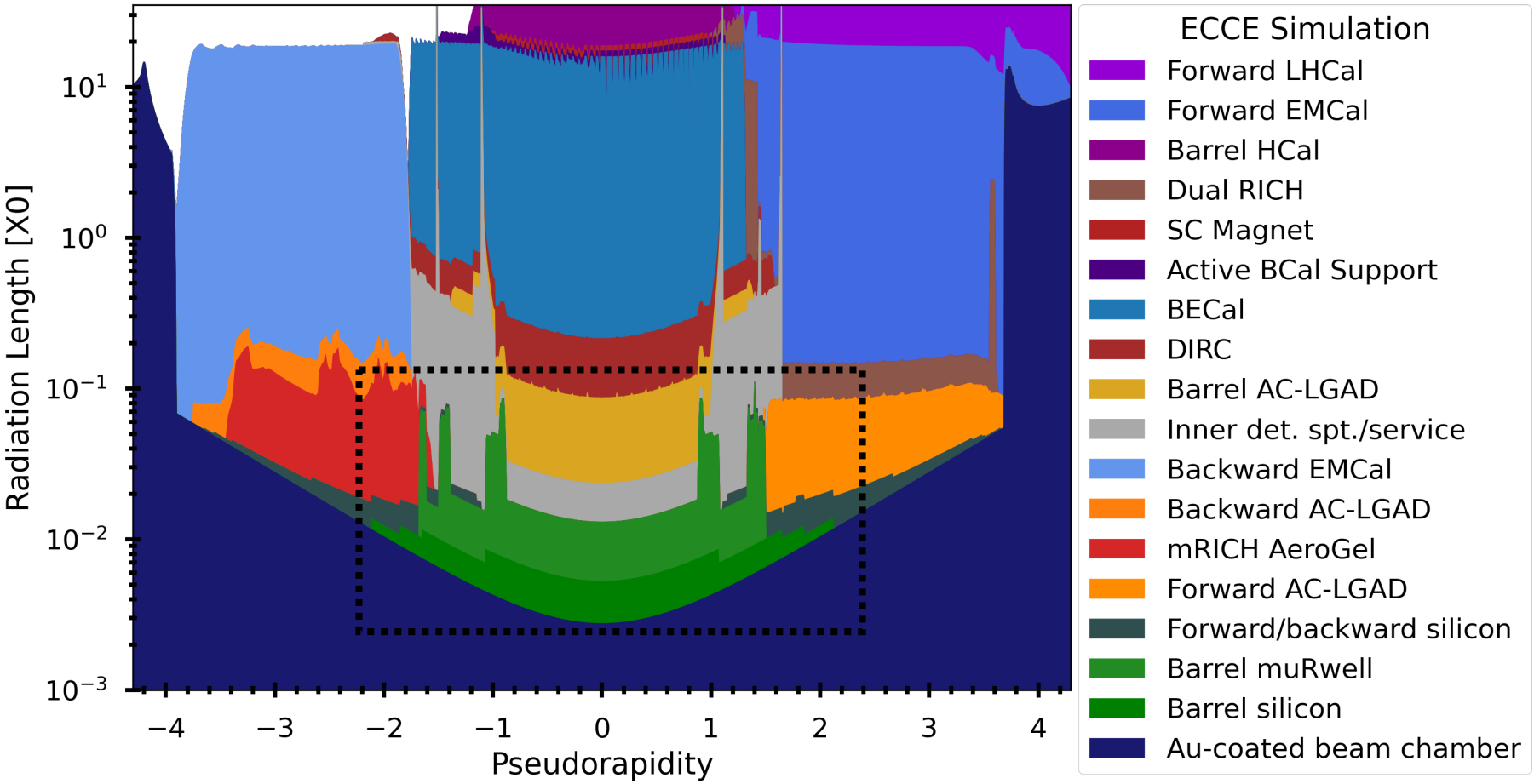
Barrel index	R (cm)	z_{min} (cm)	z_{max} (cm)
1	3.3	-13.5	13.5
2	4.35	-13.5	13.5
3	5.4	-13.5	13.5
4	21.0	-27	27
5	22.68	-30	30

H-endcap index	z (cm)	r_{in} (cm)	r_{out} (cm)
1	25	3.5	18.5
2	49	3.5	36.5
3	73	4.5	40.5
4	106	5.5	41.5
5	125	7.5	43.5

e-endcap index	z (cm)	r_{in} (cm)	r_{out} (cm)
1	-25	3.5	18.5
2	-52	3.5	36.5
3	-79	4.5	40.5
4	-106	5.5	41.5

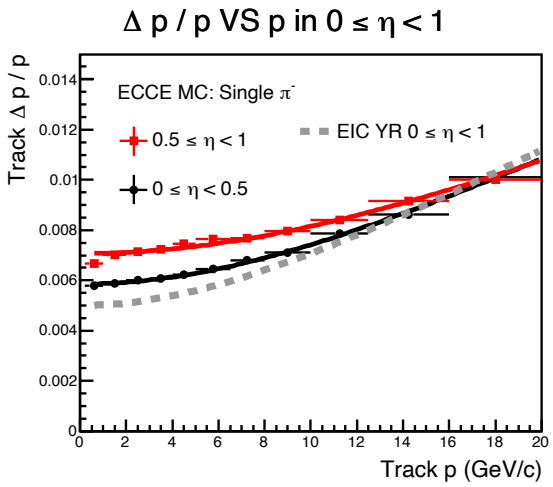
Material budgets

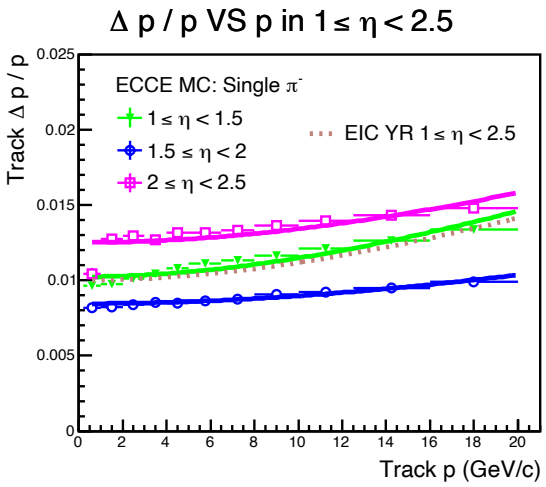
- From the Fun4All simulation, material budget scan of the ECCE detector subsystems.

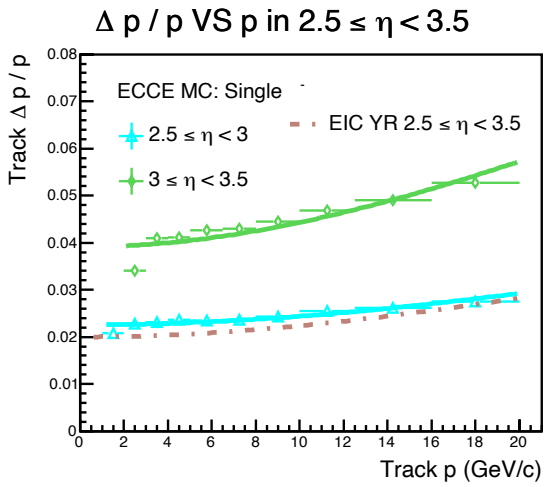


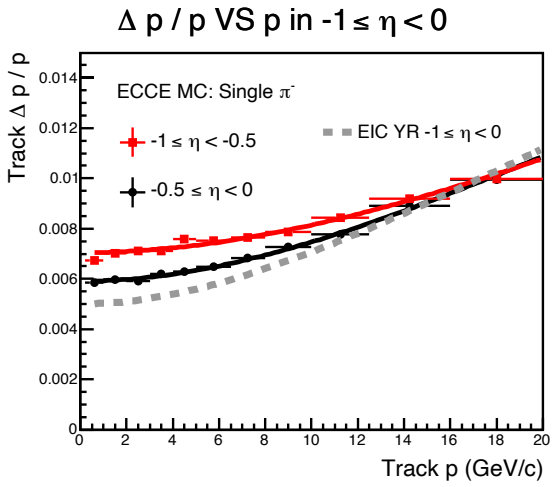
Tracking momentum resolution

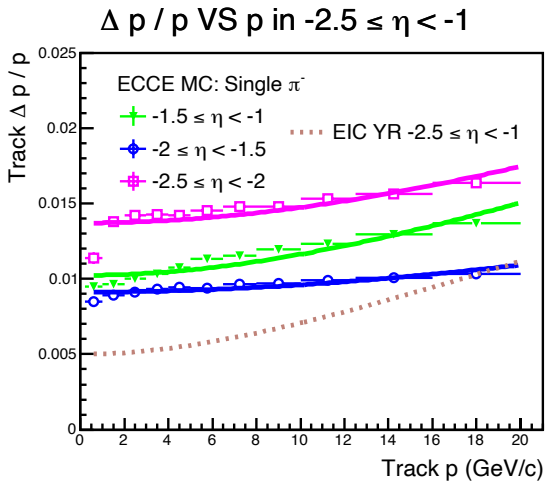
- Track momentum dependent momentum resolution.

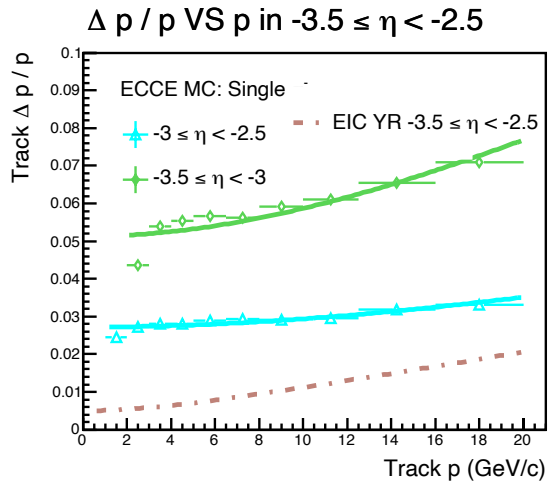






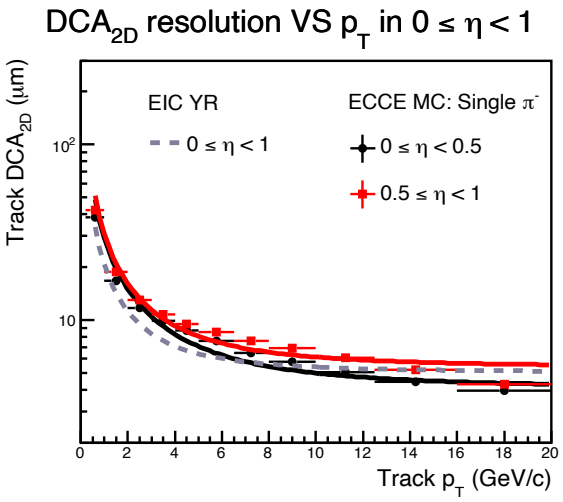


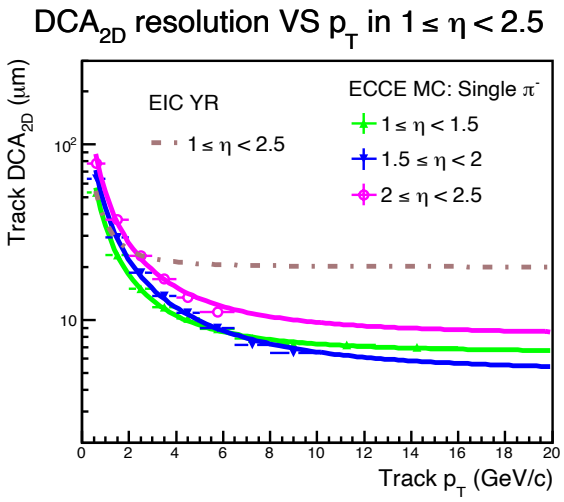


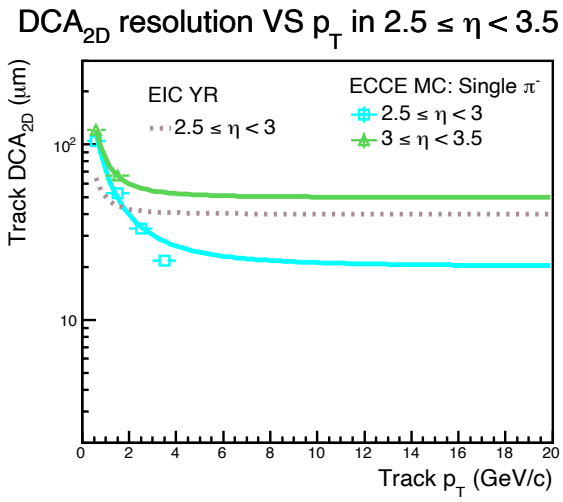


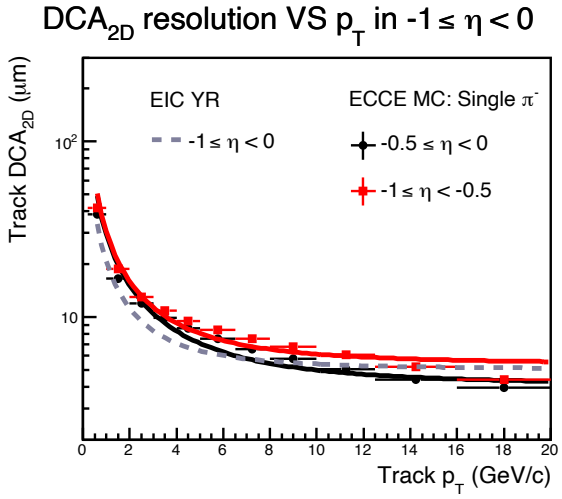
Tracking DCA_{2D} resolution

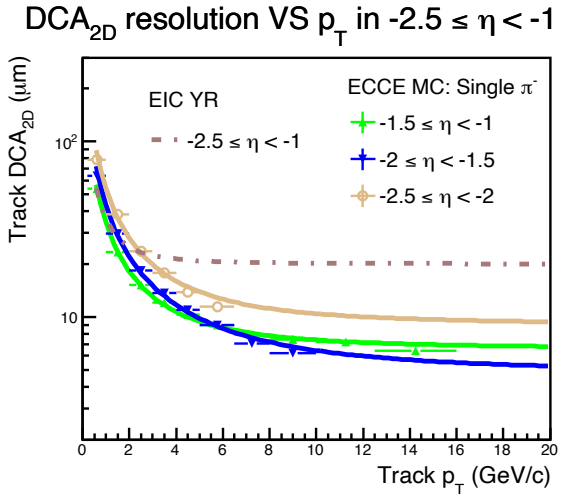
- Track p_T dependent DCA_{2D} resolution.

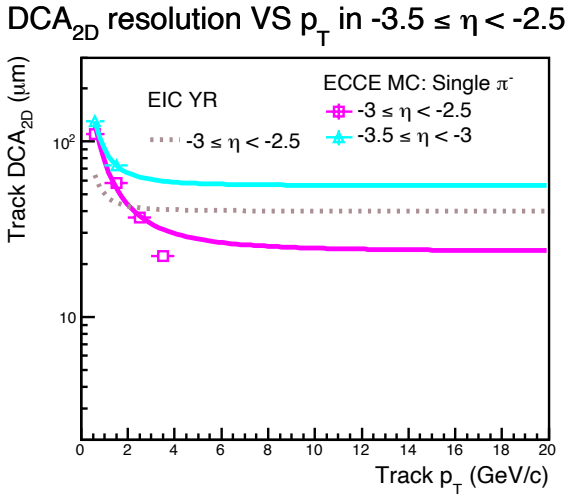












Summary and Outlook

- In addition to the default configuration, several alternative options have been studied, including switching different technologies, apply optimization with AI.
- We look forward to collaborate with the EIC Si Consortium to implement latest updates and apply optimizations.