Week 1 - FCC Beam Background

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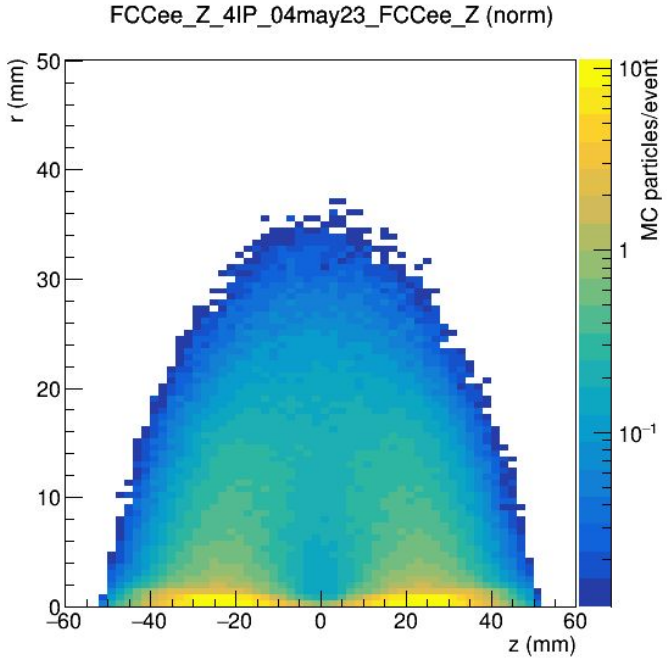
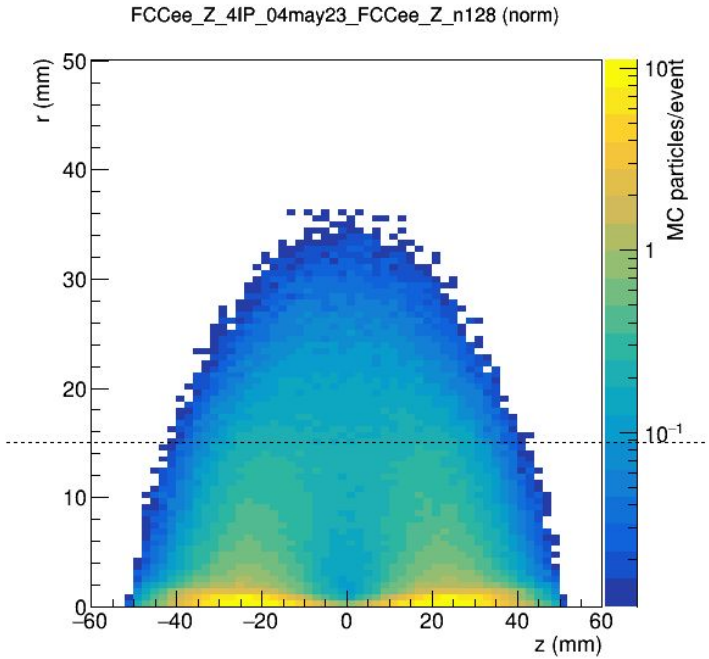
Validating MC Particle Data

- Compare 2 Guinea Pig sets for electron positron collisions
  - 256 vs. 128 cell grid
  - 8 h vs. 1 h
- Focus on IPC creation and occupancy

IPC creation on a log scale





**dotted line is the beam pipe radius*

IPC Yields

	n256	n128
IPC’s per event	916.89	847.26
IPC’s outside pipe/event	90.27	79.44
Fraction outside	0.0985	0.0938

- Total IPC’s /event: −7.6 %
- IPC’s outside pipe/event: −12.0 %
- Fraction outside: −4.8 %

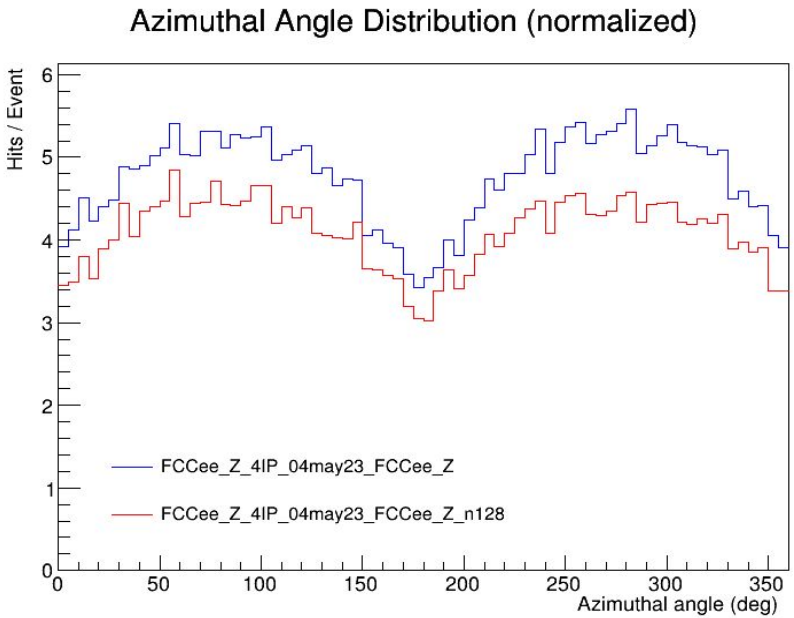
Vertex Detector

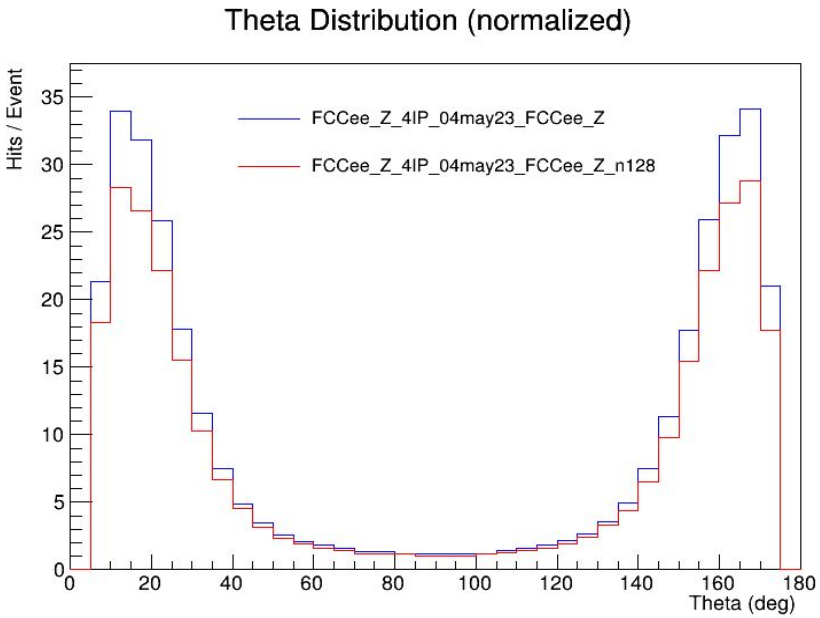
- The readouts on the actual vertex detector decrease as expected
- Occupancy decreases with the coarser mesh

	n256	n128
Max Occupancy	186.4	157.0
Avg Occupancy	160.6	138.0

Detector Readouts

- If scaled to area = 1, the shapes are the same
- Hits/event shifts down as expected





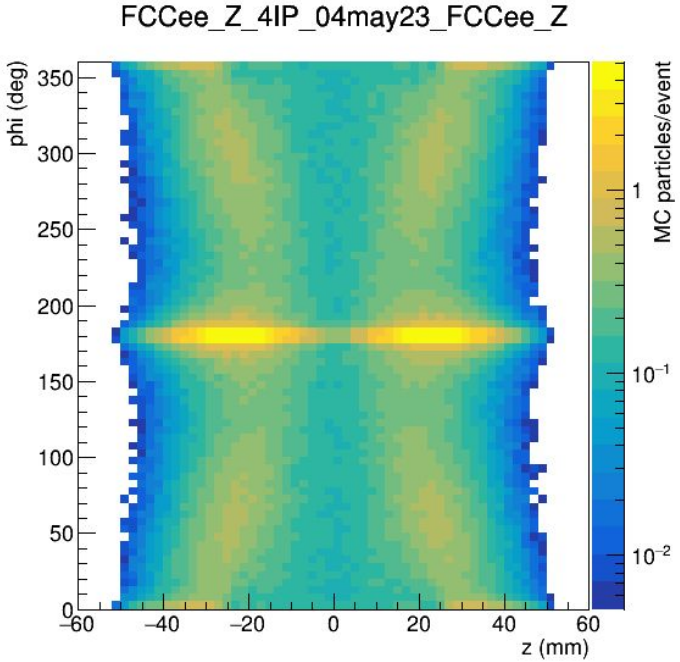
Conclusion and Next Steps

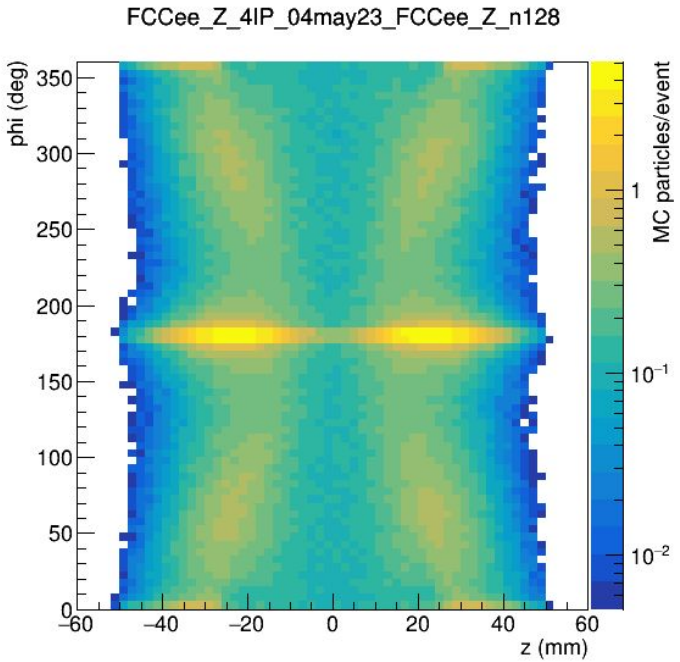
- n128 is within 10% of n256
- Can use n128 for future studies

TODO:

- Sanity check with n512
- Check distributions and occupancy with magnetic field as a parameter (1, 2, 3 Tesla)
- Add the magnetic field in the beam dynamics simulation (experimental)

IPC creation on a log scale





IPC creation on a log scale