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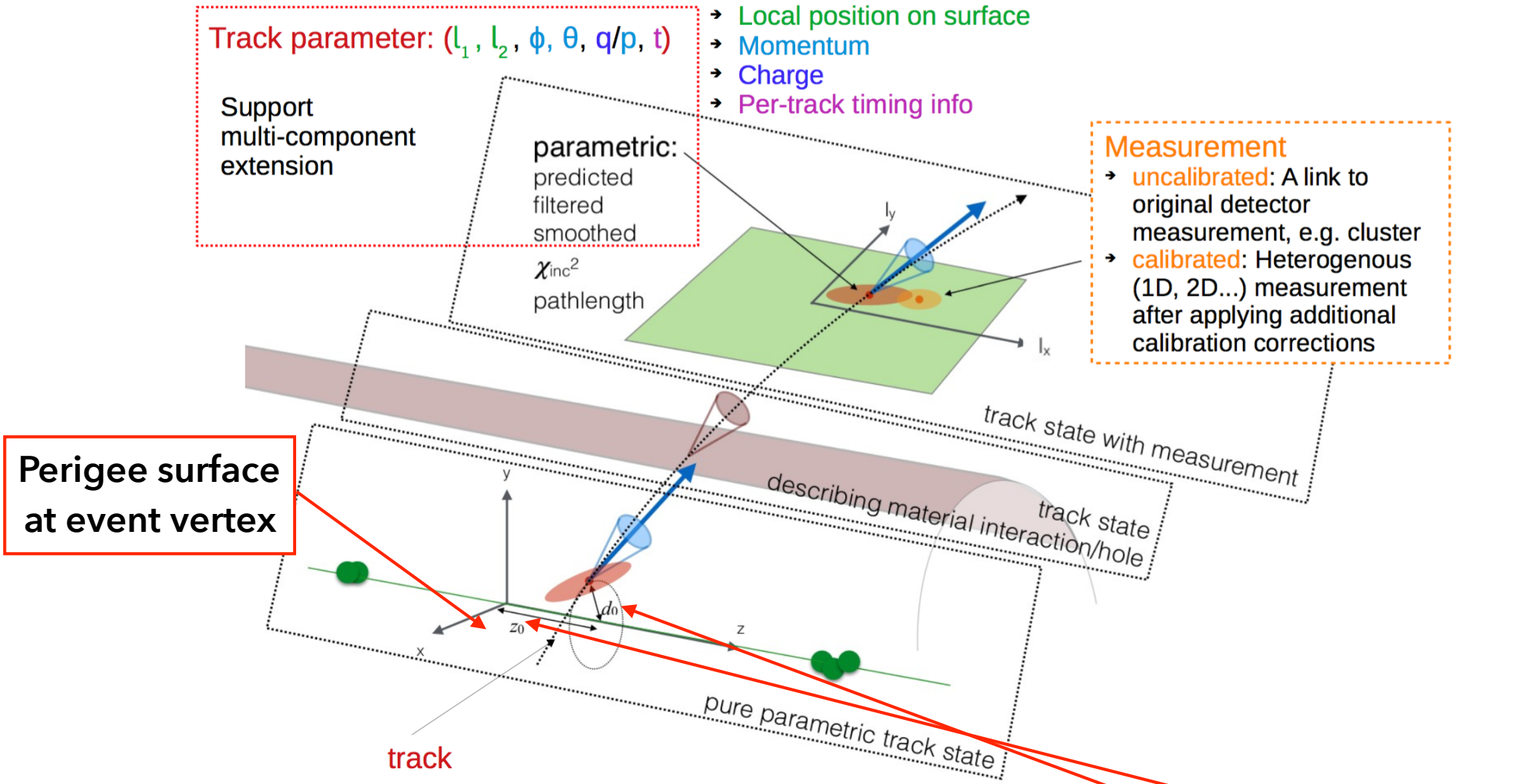
Single track pointing resolution in ATHENA software

Wenqing Fan (Lots of help from Shujie)

ATHENA tracking meeting

ATHENA

Single Track DCA



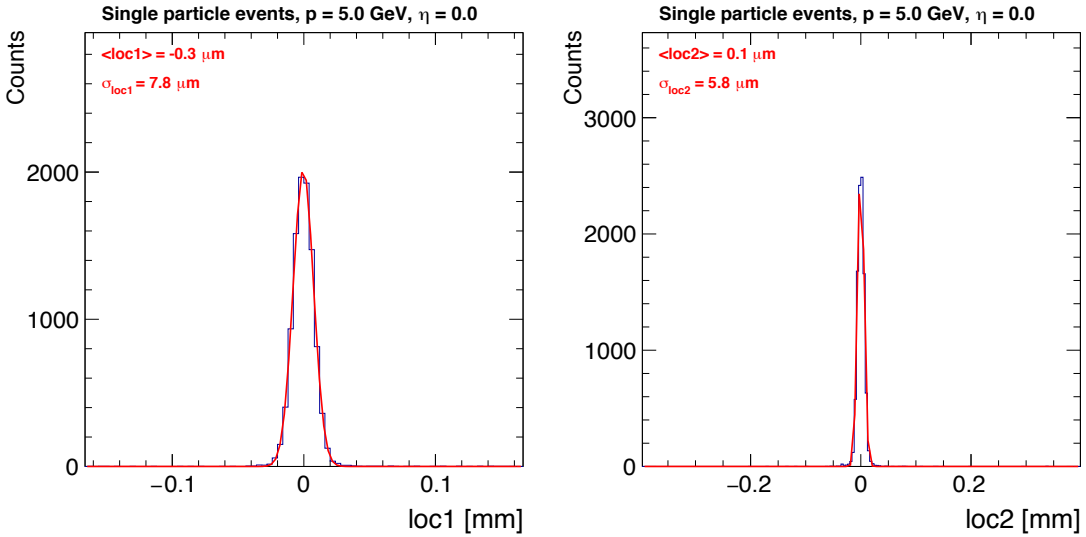
From extracted track parameters at perigee surface: $l_1 = d_0$, $l_2 = z_0$

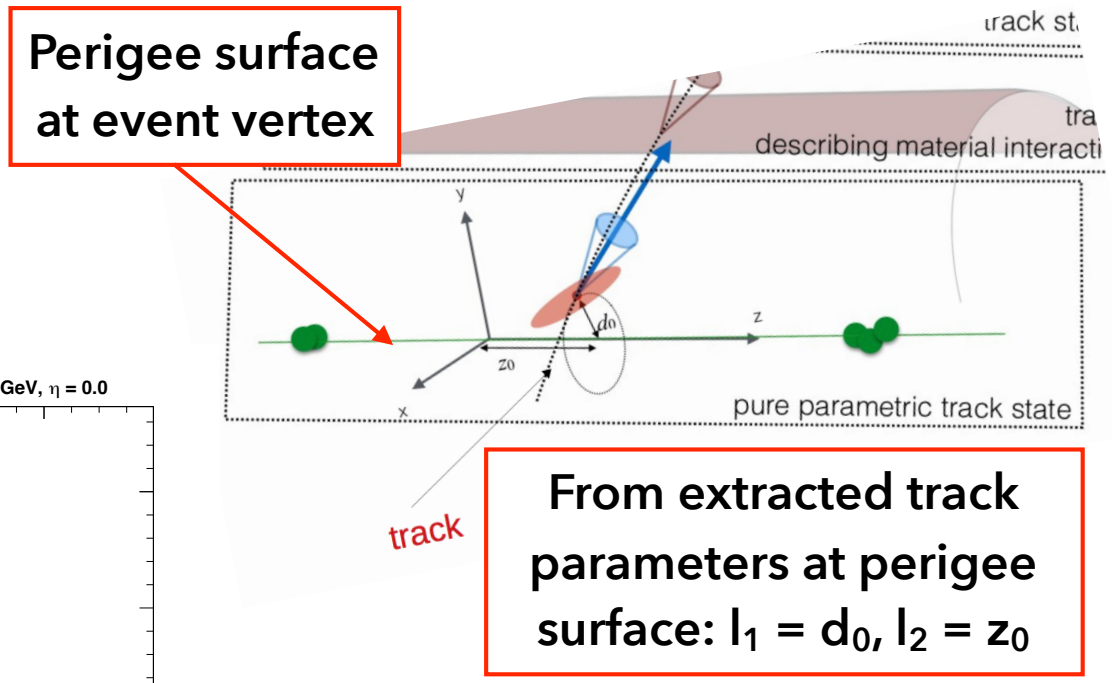
Code in ATHENA

```
//// Construct a perigee surface as the target surface
auto pSurface = Acts::Surface::makeShared<Acts::PerigeeSurface>(Acts::Vector3{0., 0., 0.});
```

Single Track DCA

- DCA calculation
  - Use track paramters (d_0, z_0) at Perigee surface

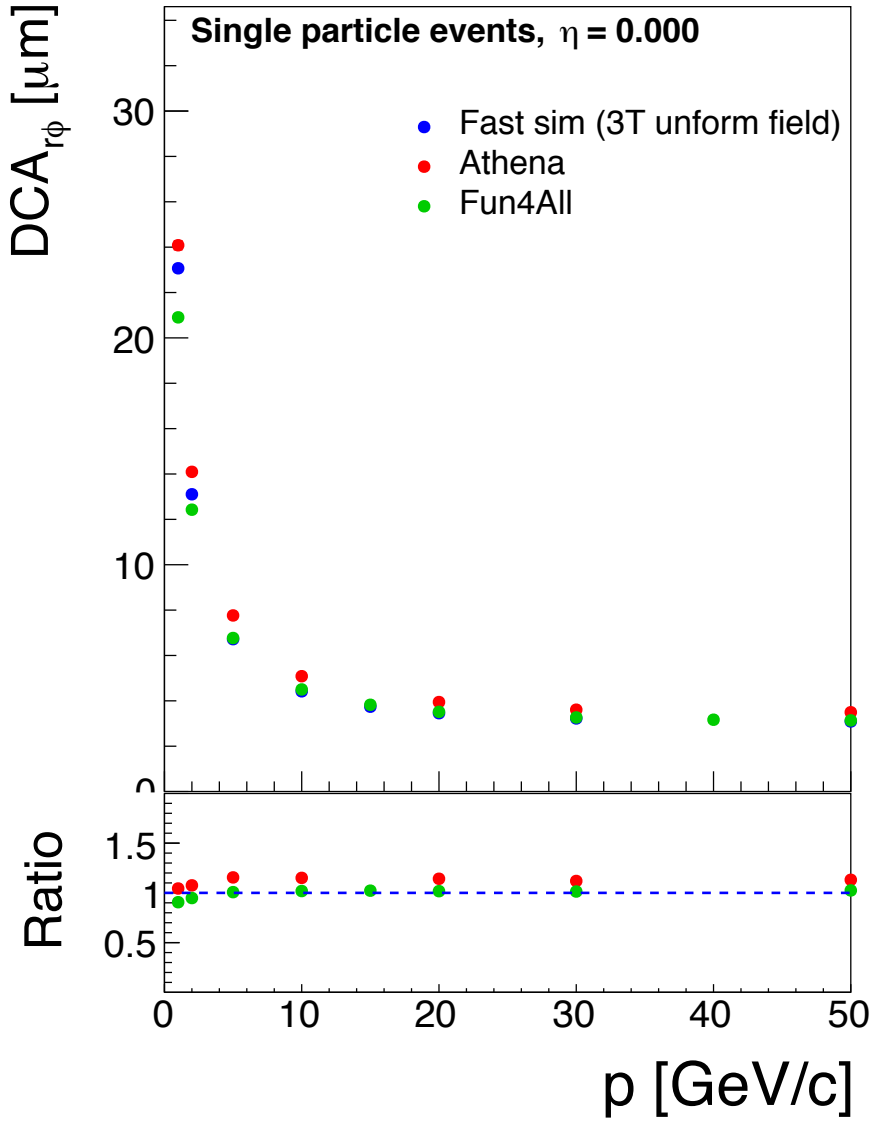


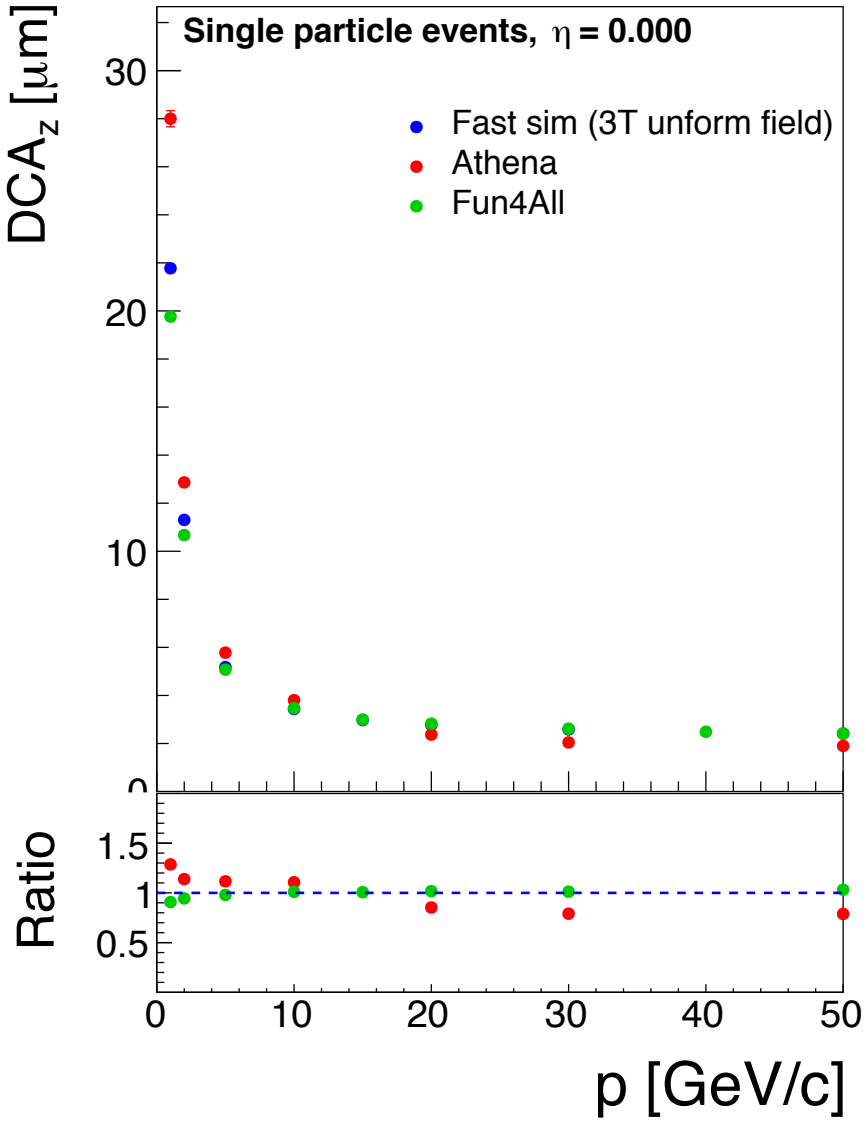


- Comparing to fast simulation from Ernst and Fun4All from Rey
  - Fast sim uses constant B field = 3T
  - Full sim: magnetic field map (dated 05/07)
  - With beam pipe

DCA comparison with All-Si setup

- Good agreement between fast sim/Fun4All/ATHENA





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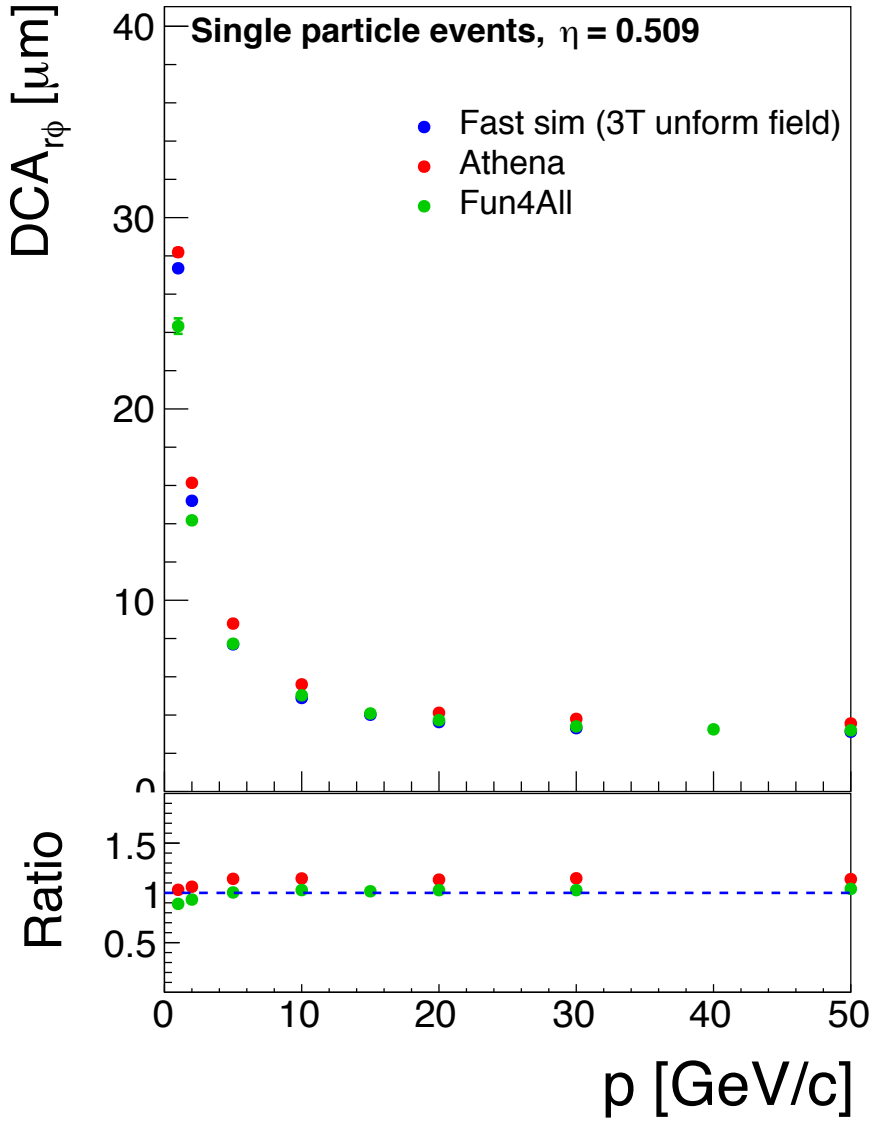

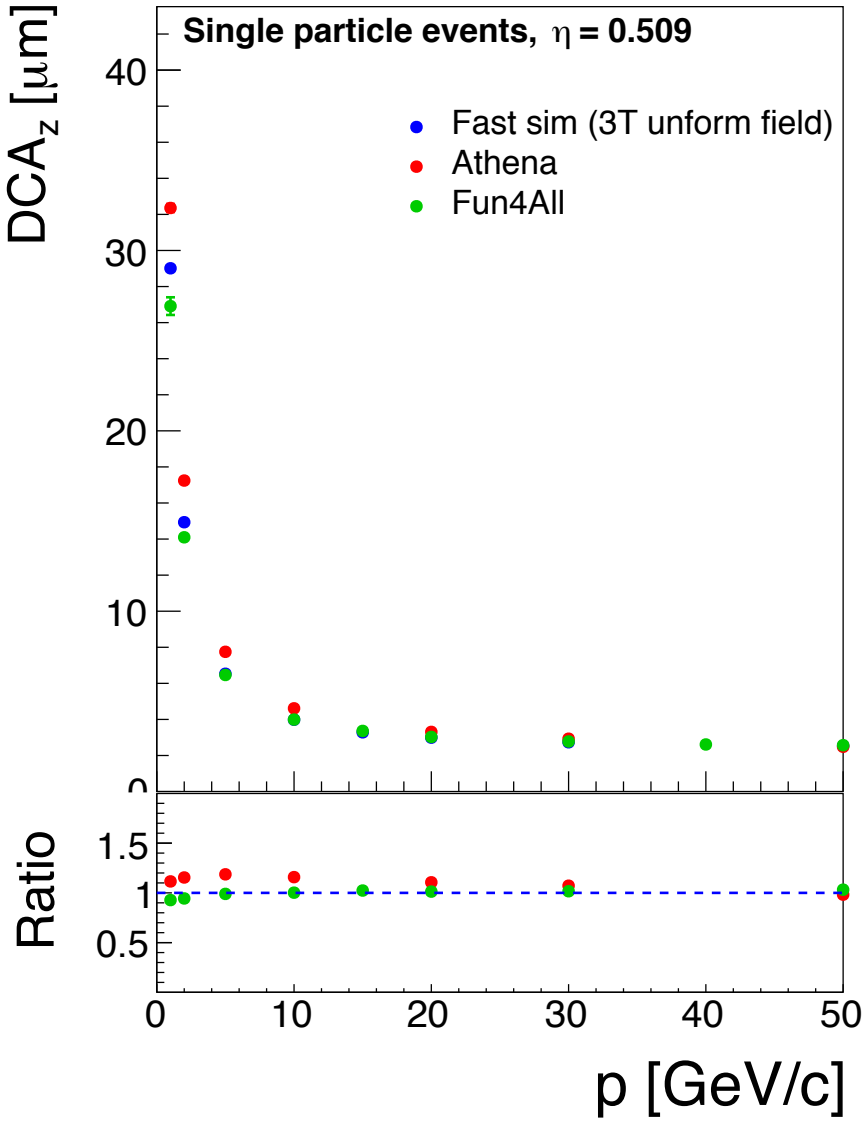

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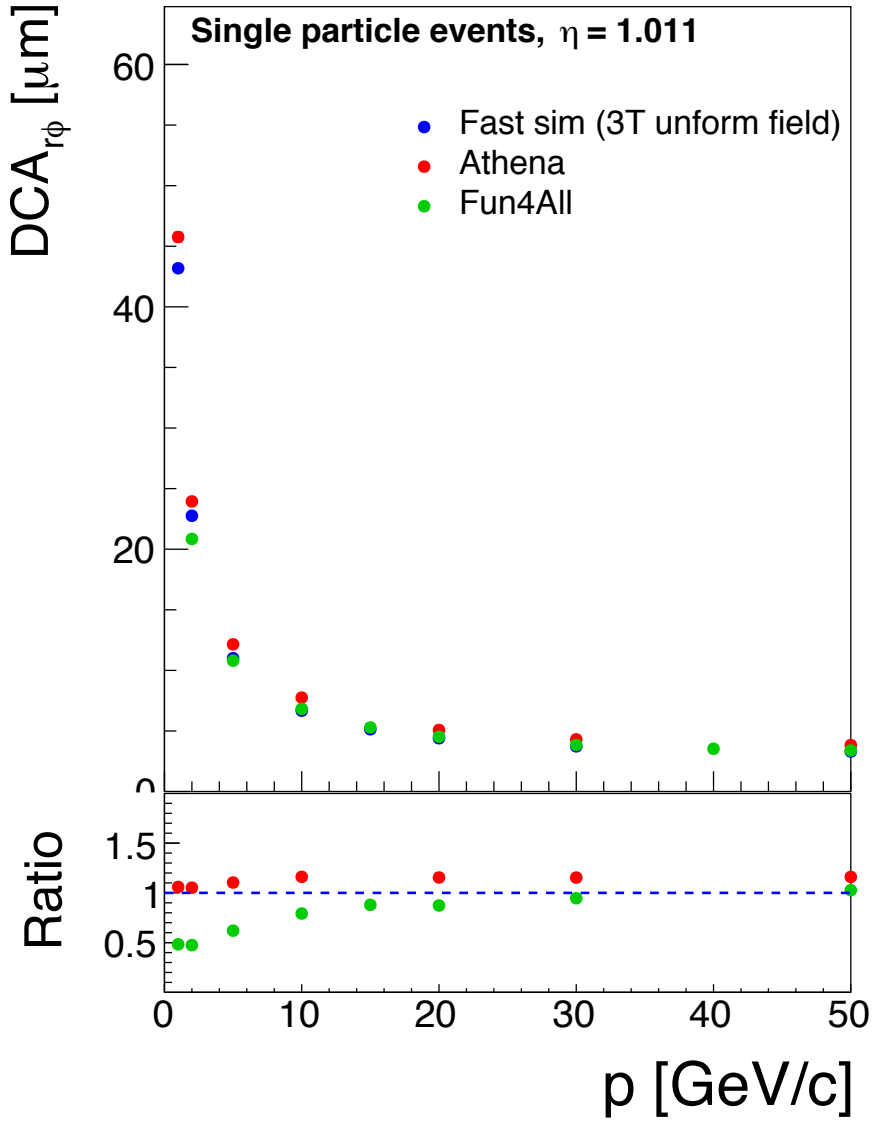

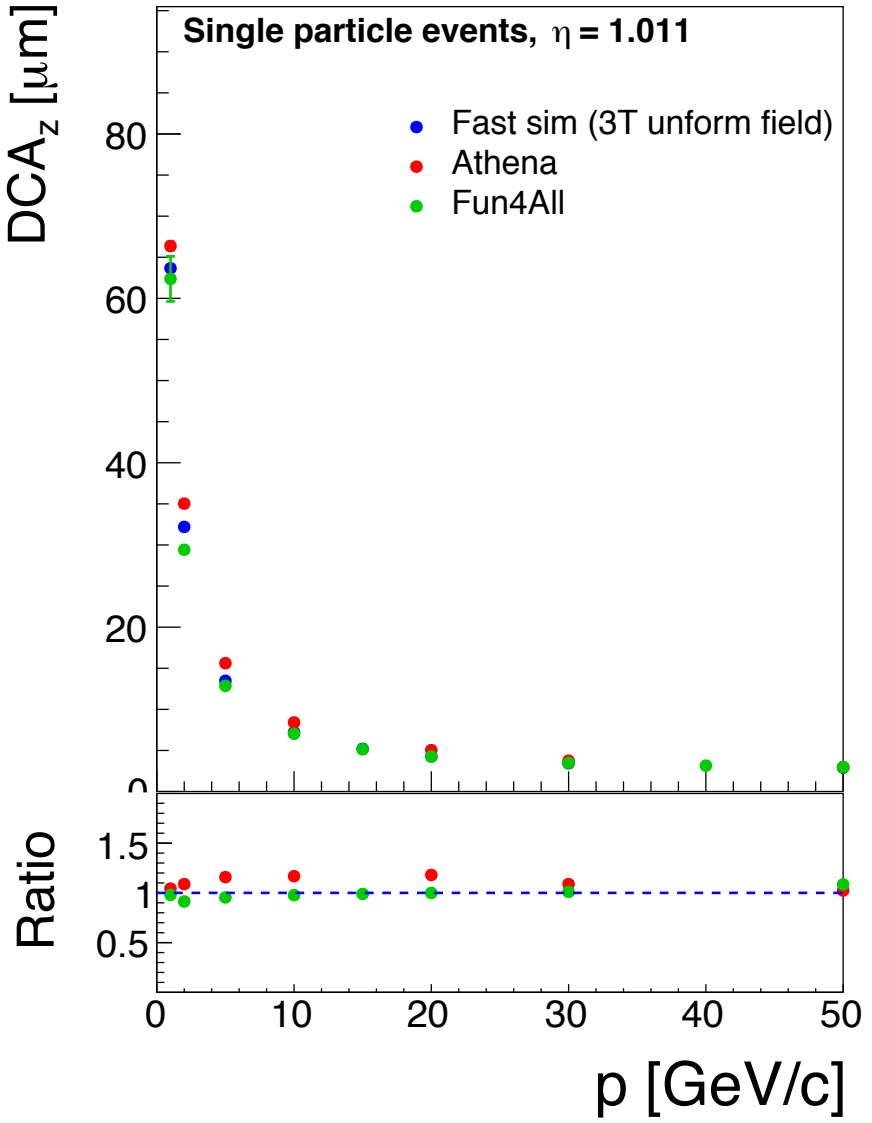

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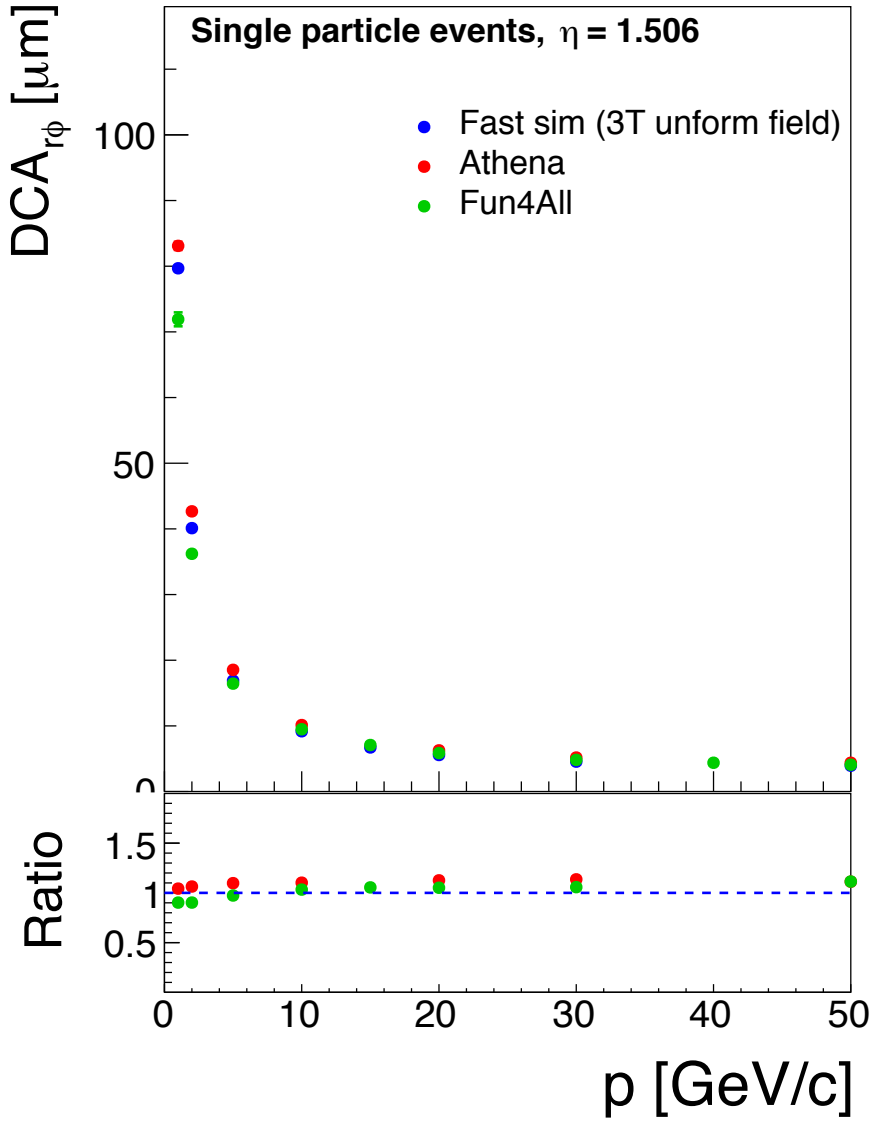

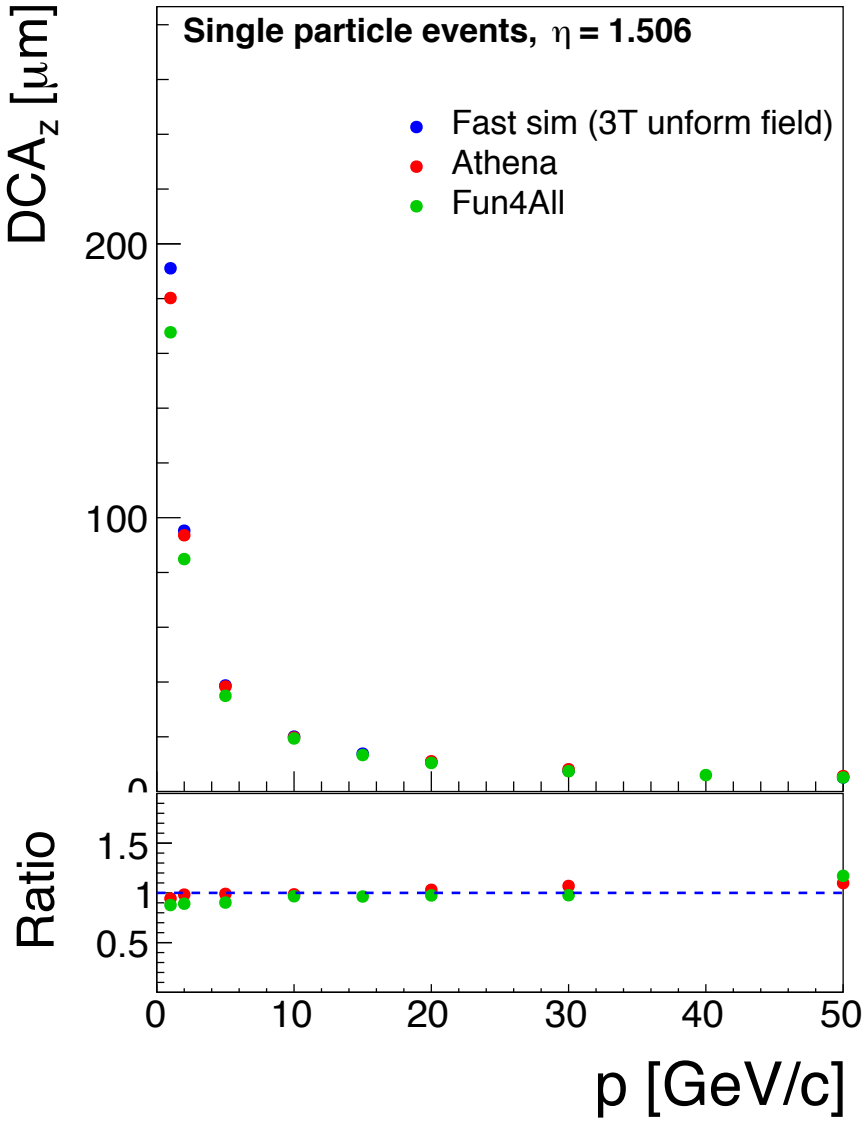

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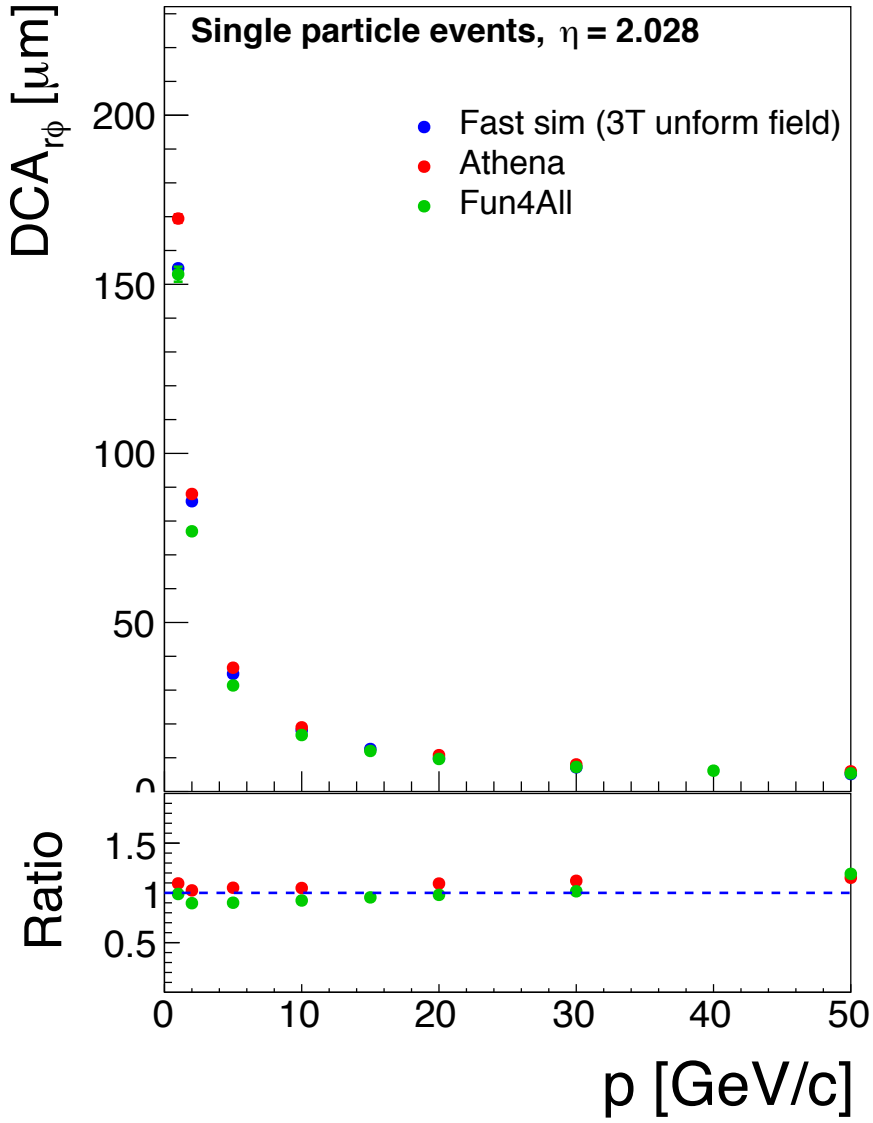
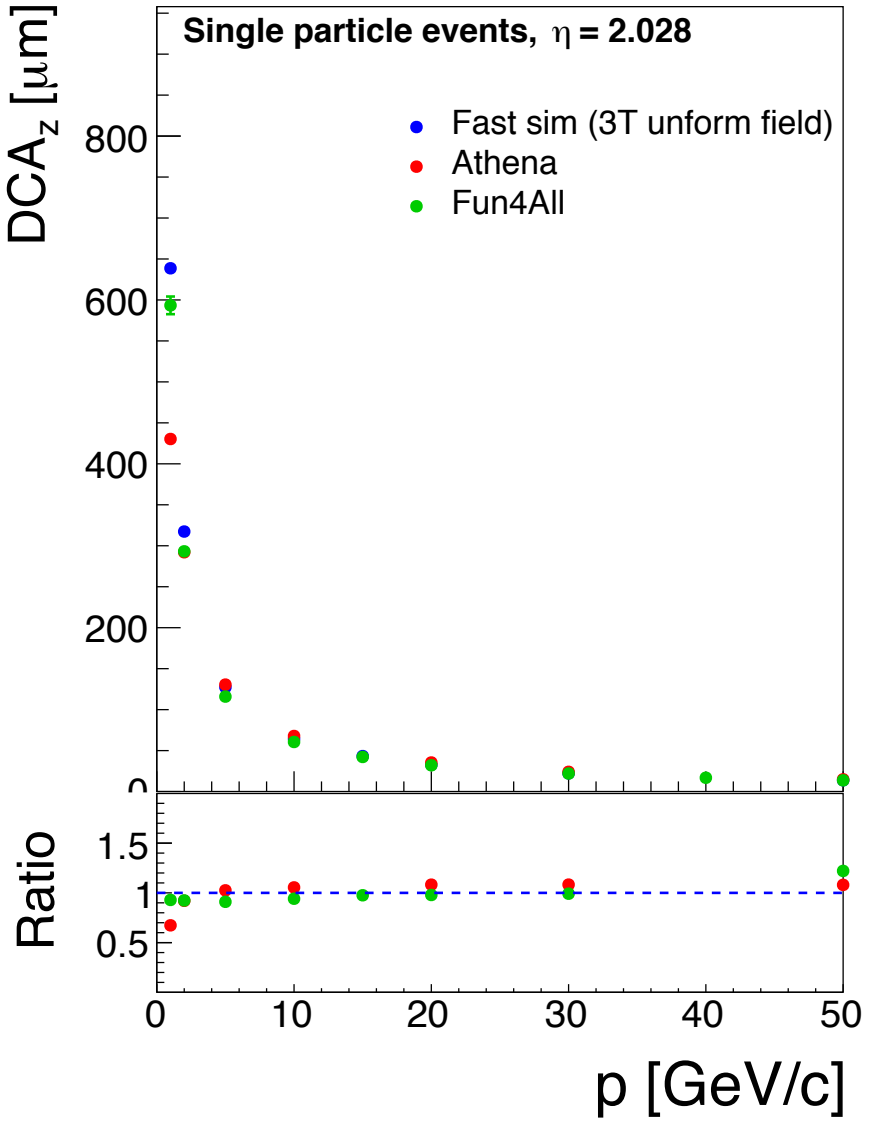
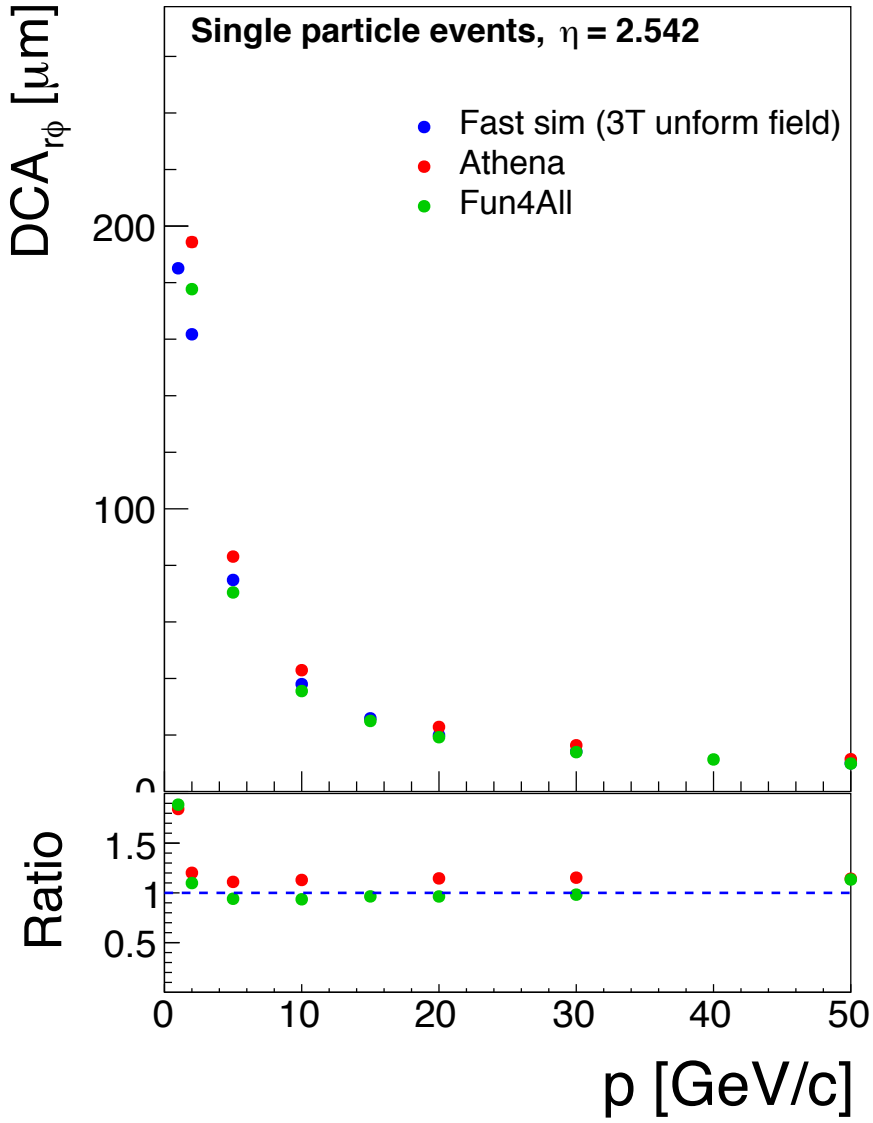
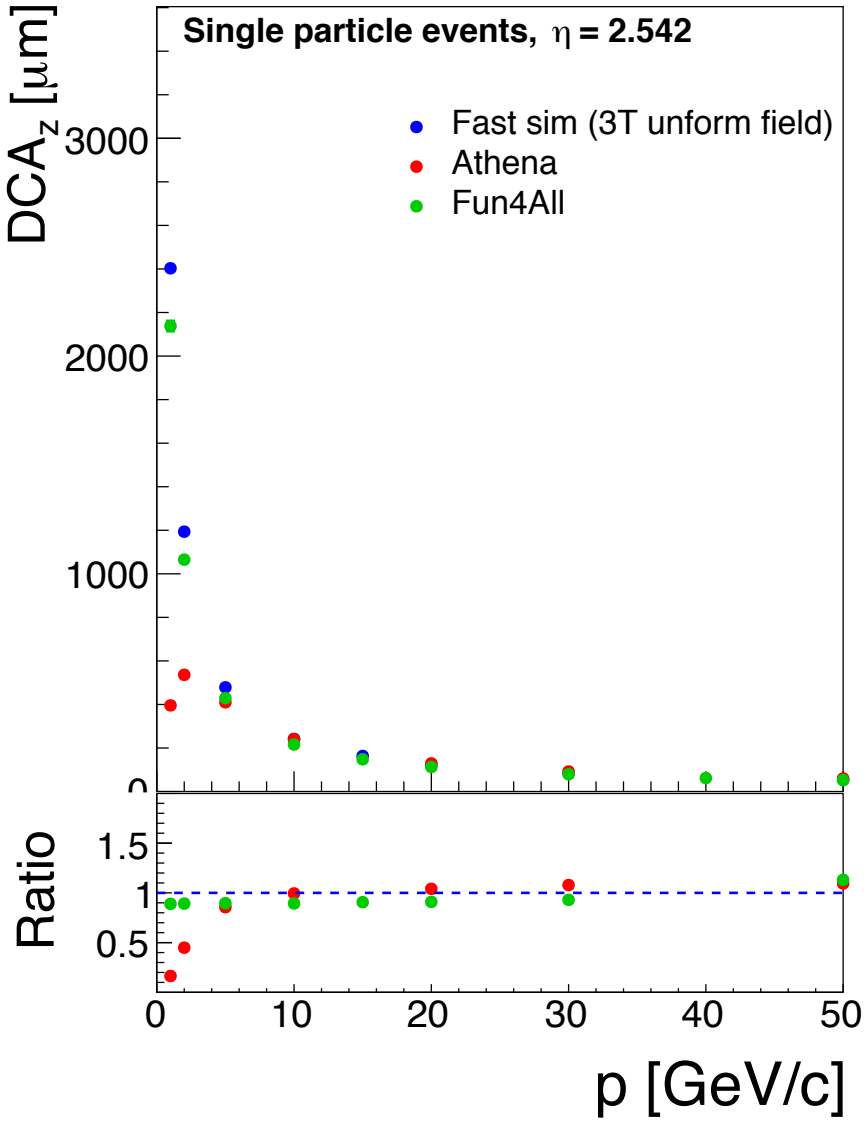




DCA comparison with All-Si setup

- Small DCA_Z at low p at very forward direction





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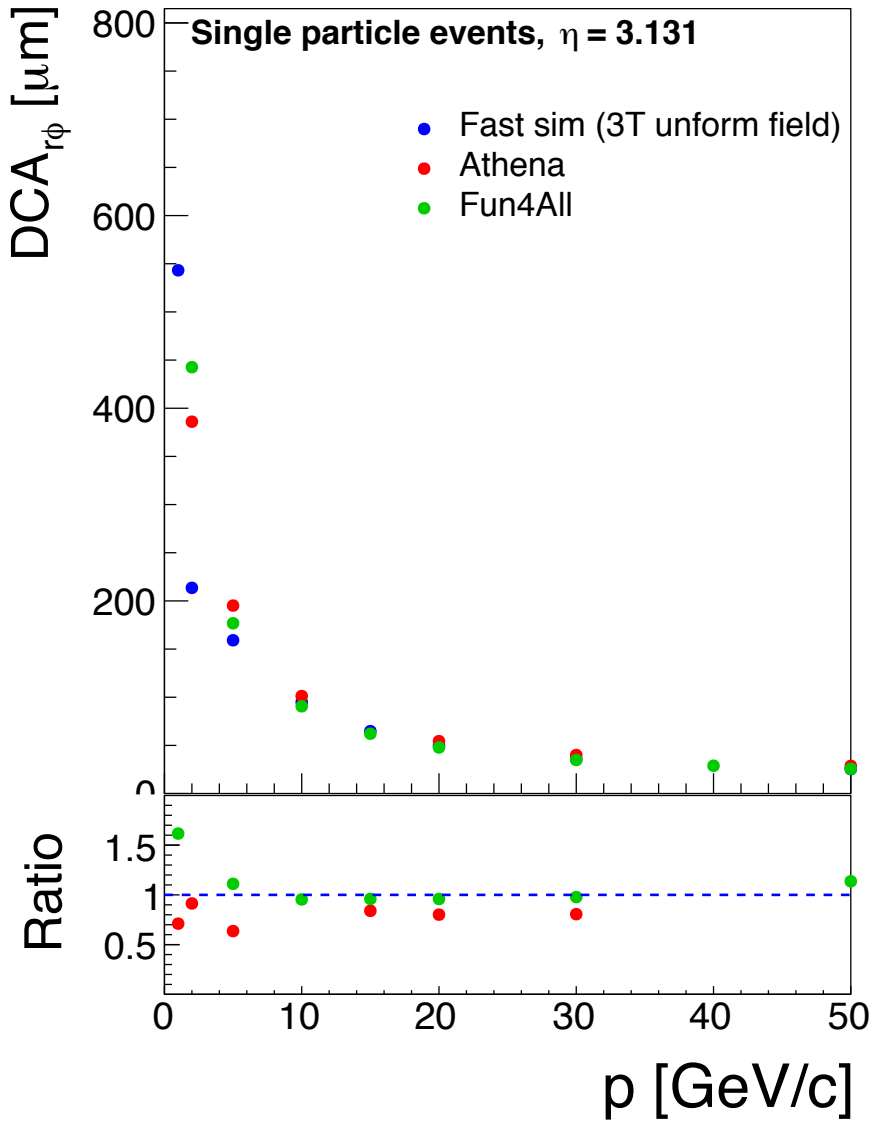

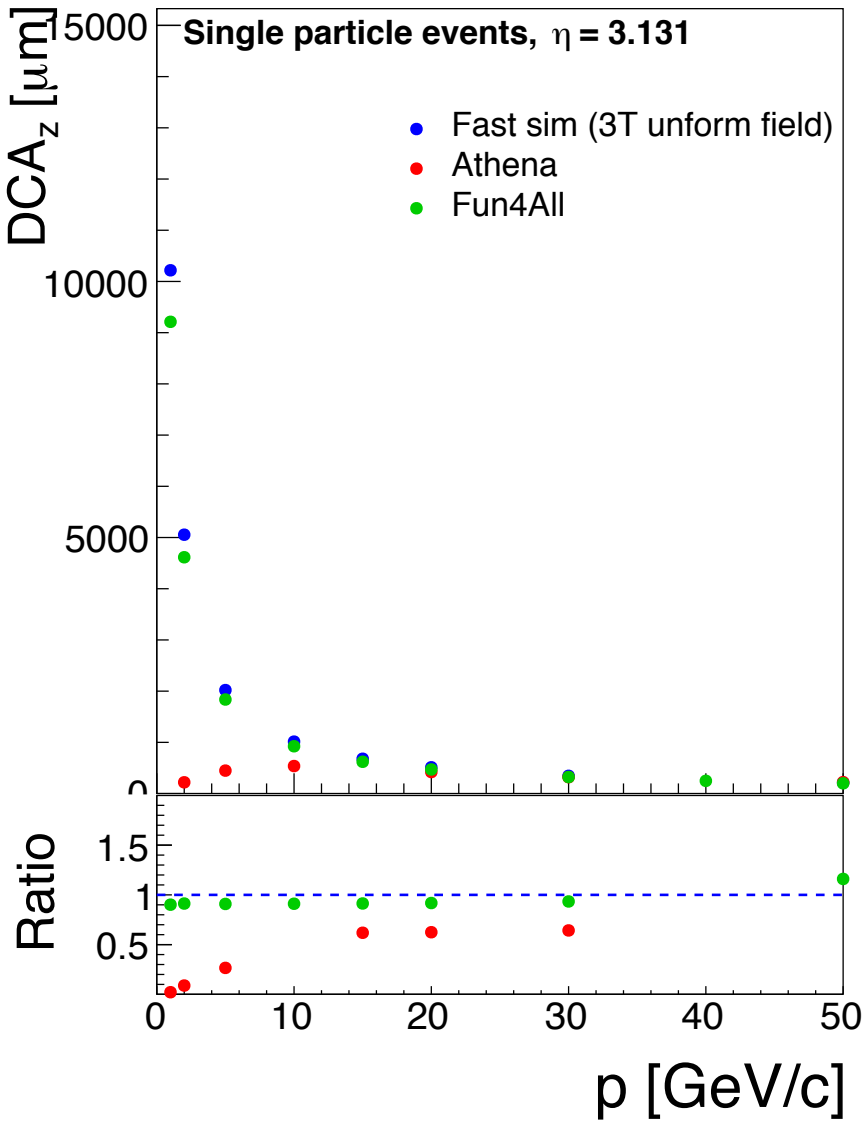

Summary

- Good agreement for $DCA_{r\phi}$ between fast sim/Fun4All/ATHENA
- Good agreement for DCA_z except for very forward and low momentum
  - Still investigating, might be related to the beam pipe