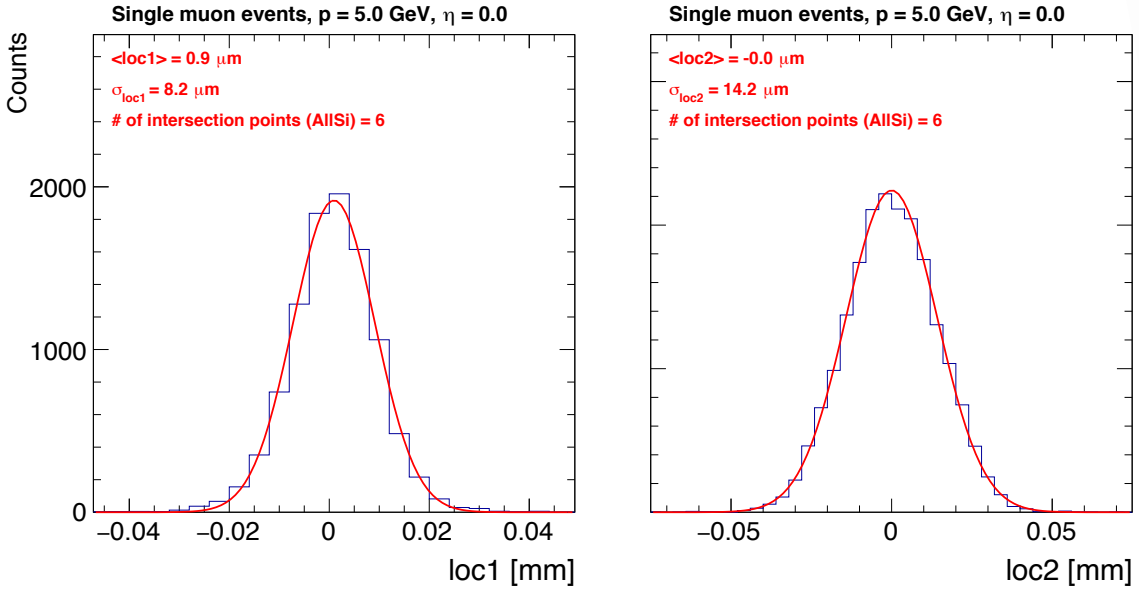
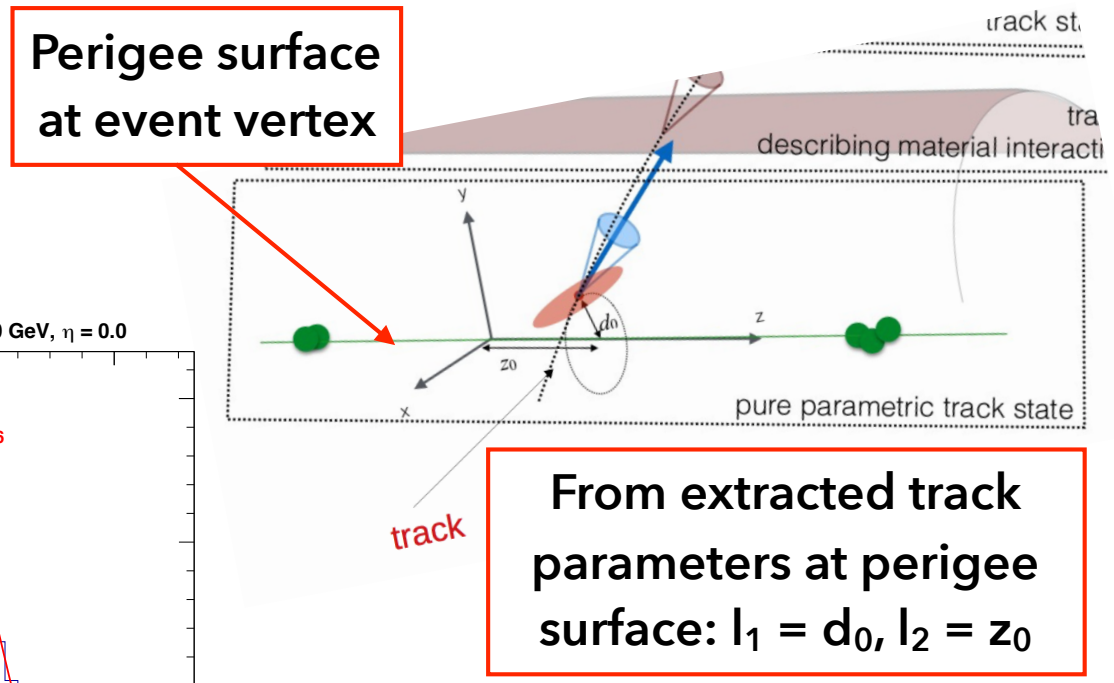
Single Track DCA

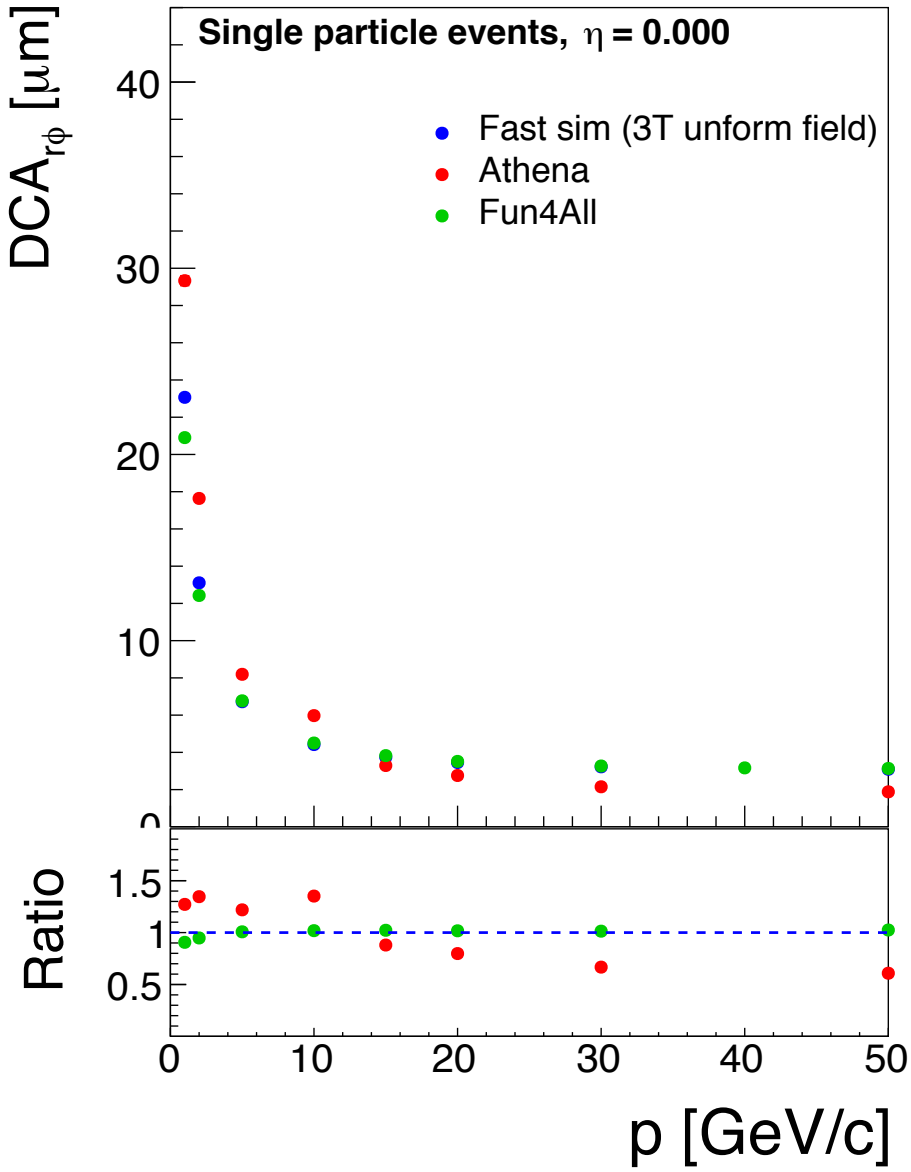
- DCA calculation
  - Use track paramters (d_0, z_0) at Perigee surface

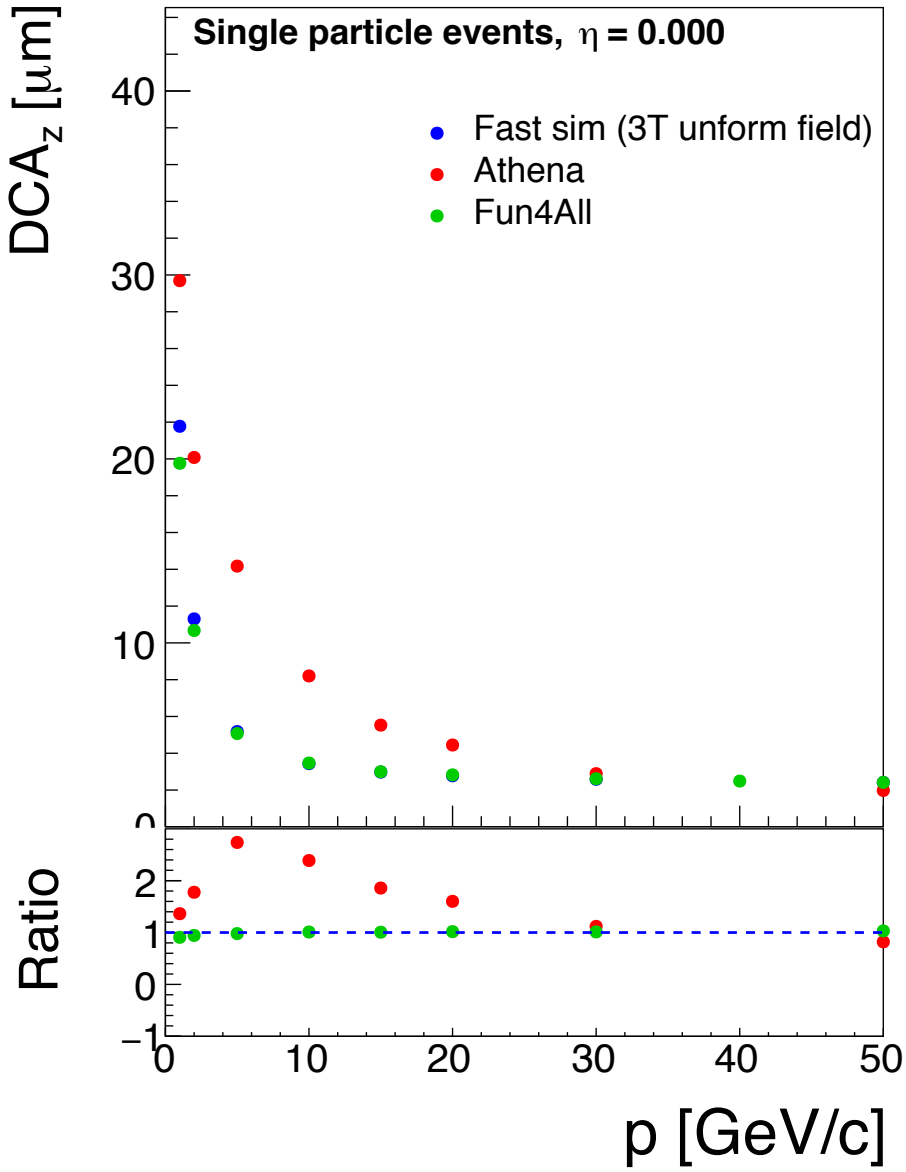




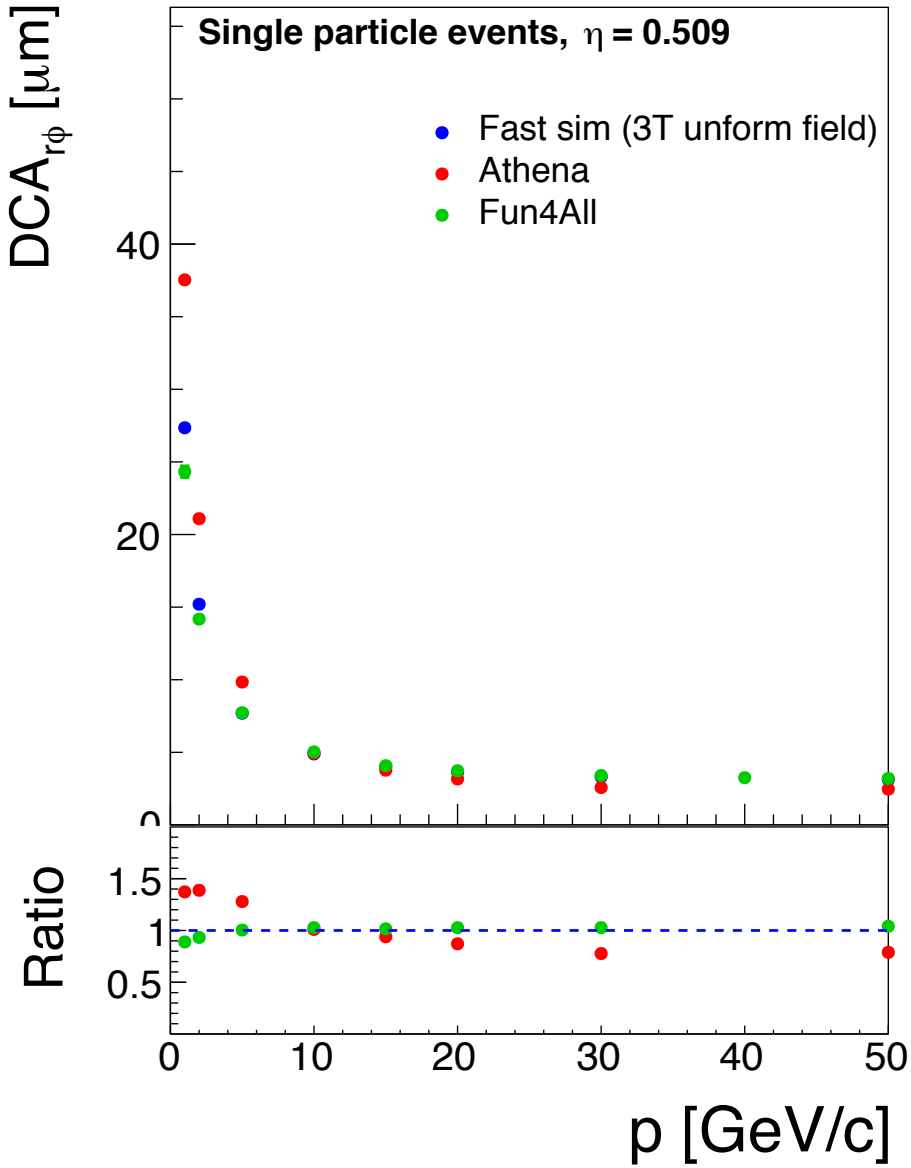
- Comparing to fast simulation from Ernst and Fun4All from Rey
  - Fast sim uses constant B field = 3T
  - Full sim: magnetic field map (dated 05/07)
  - With beam pipe

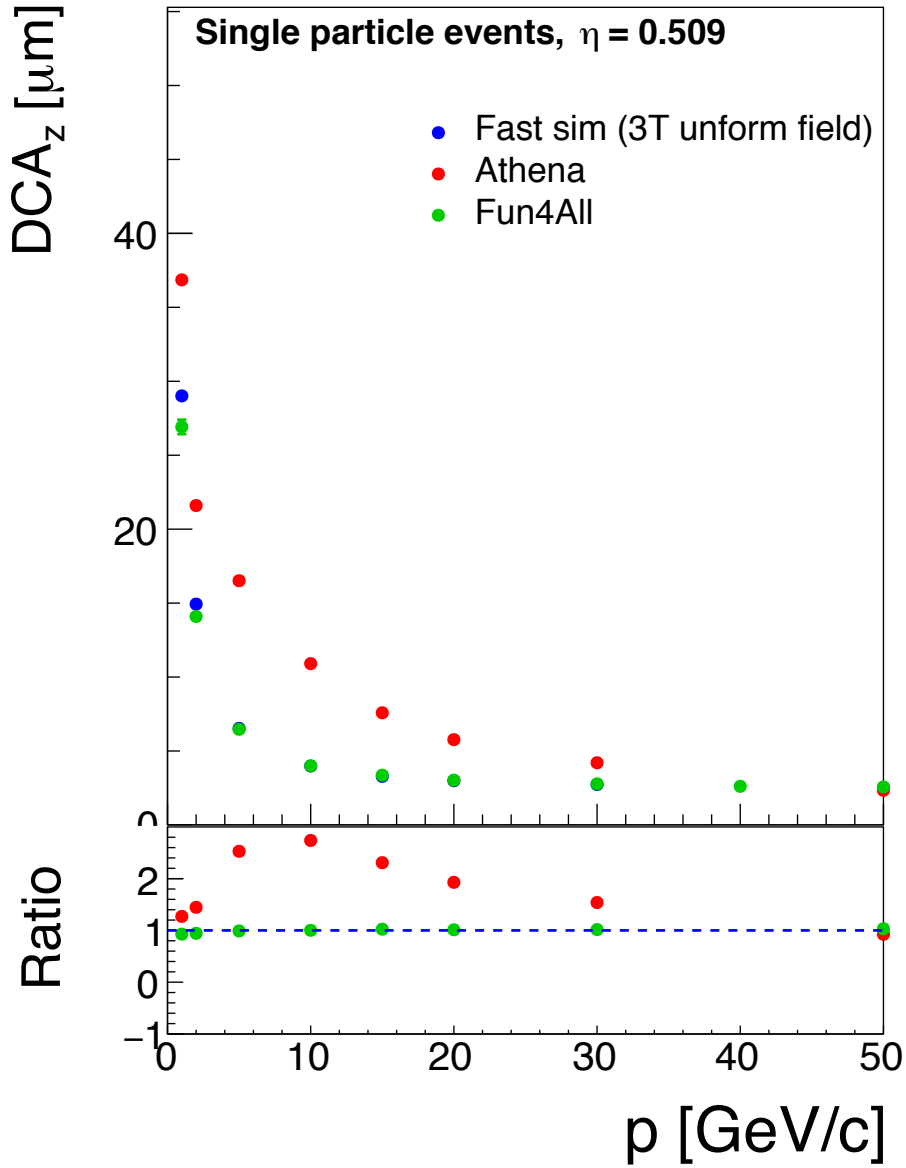
DCA comparison



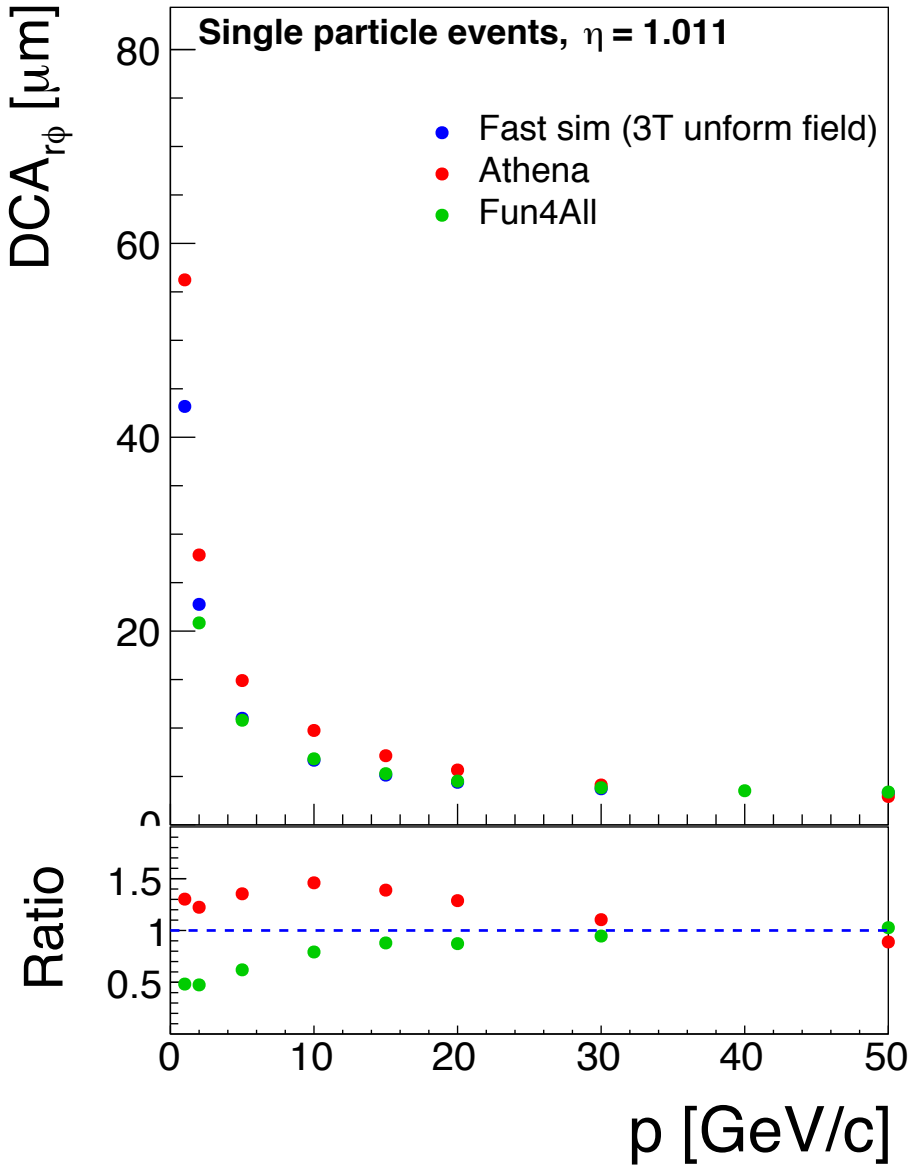


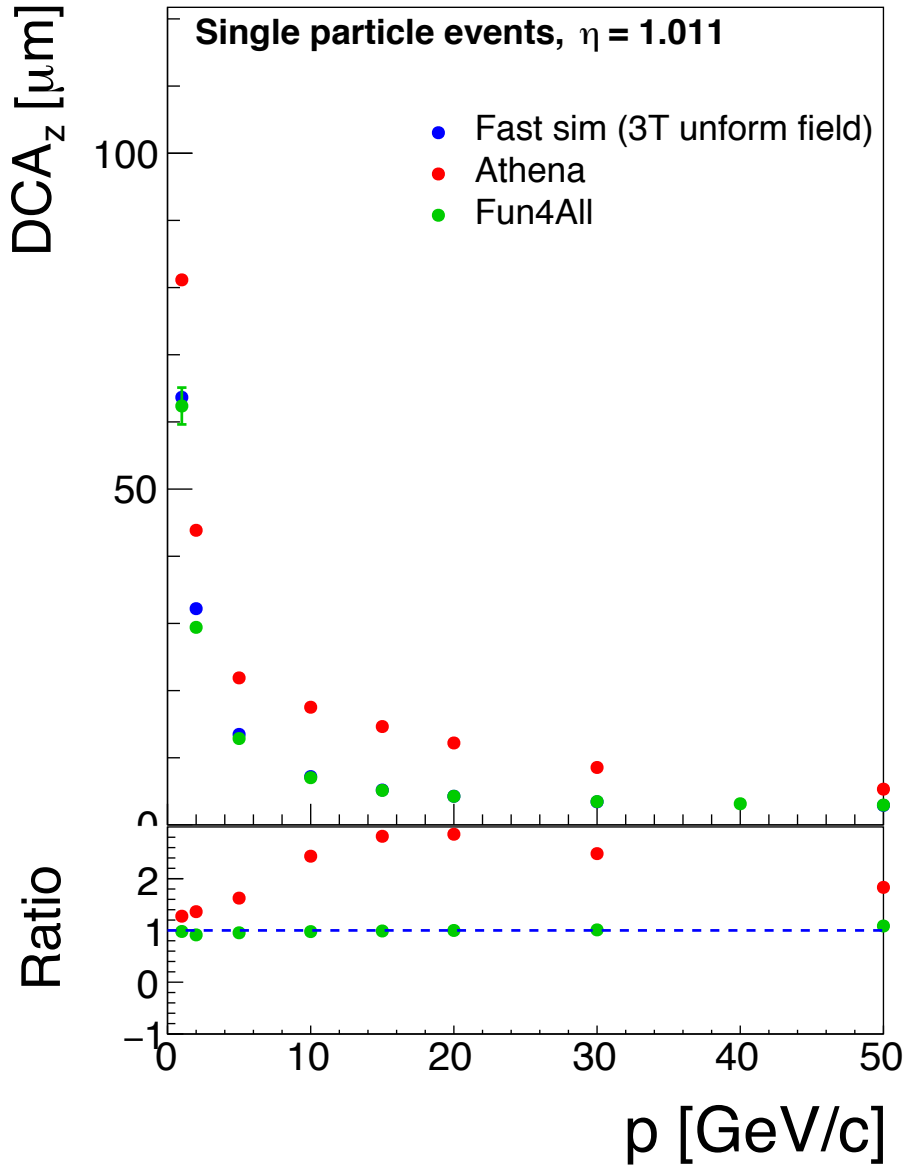
DCA comparison



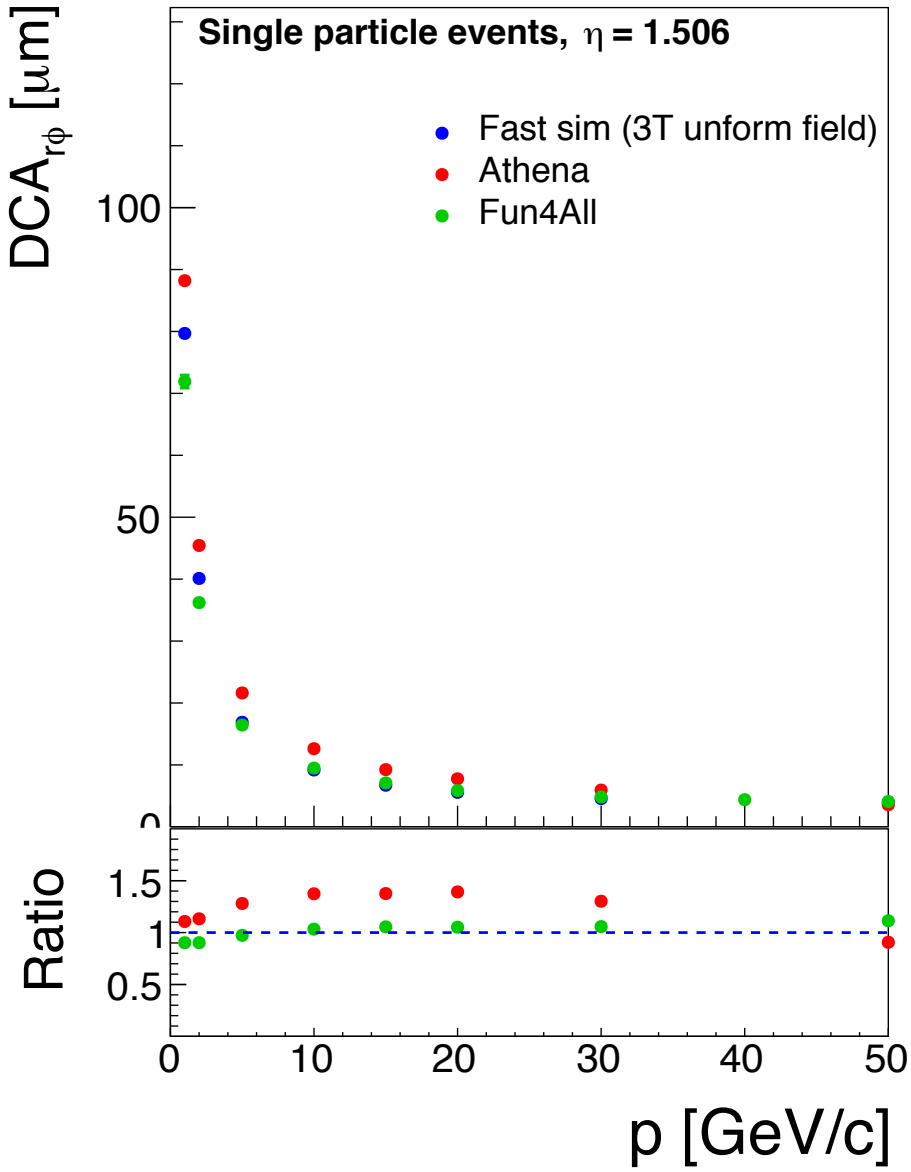


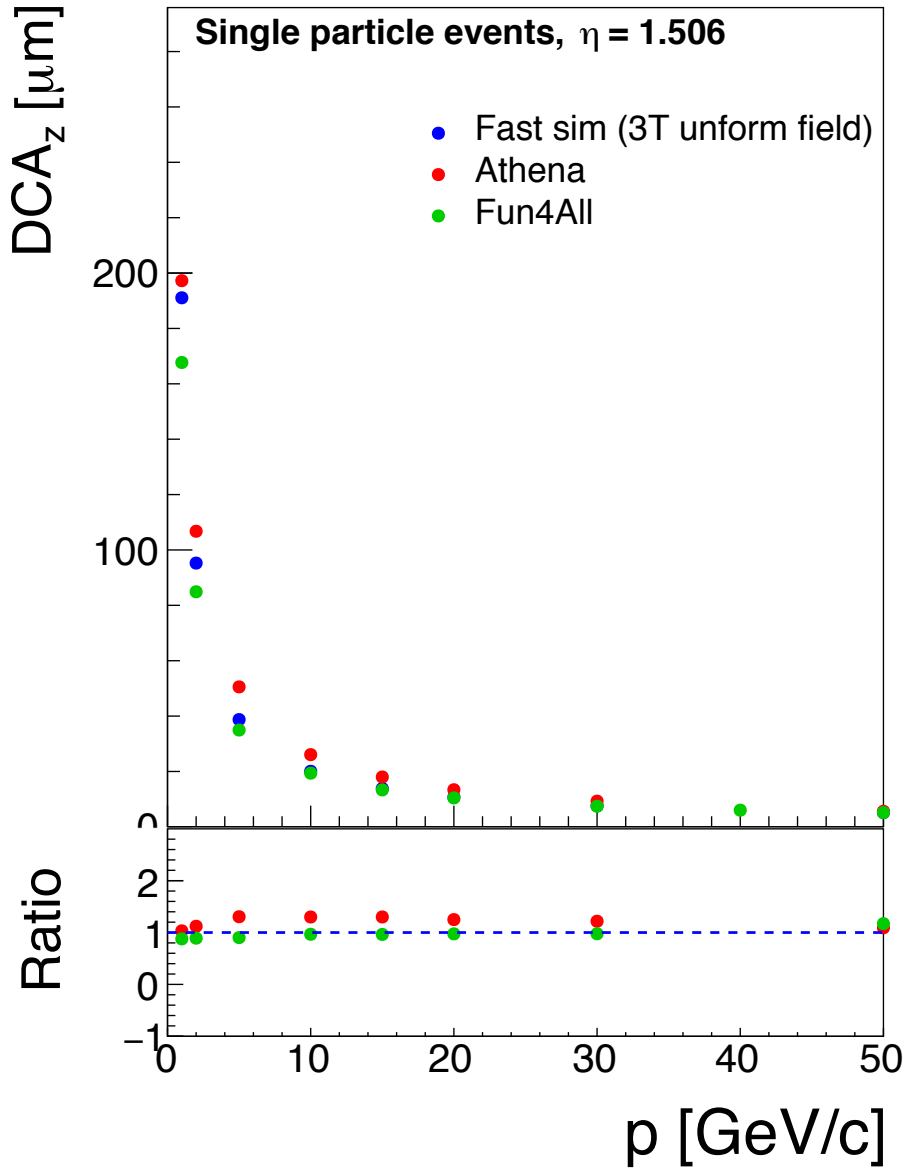
DCA comparison



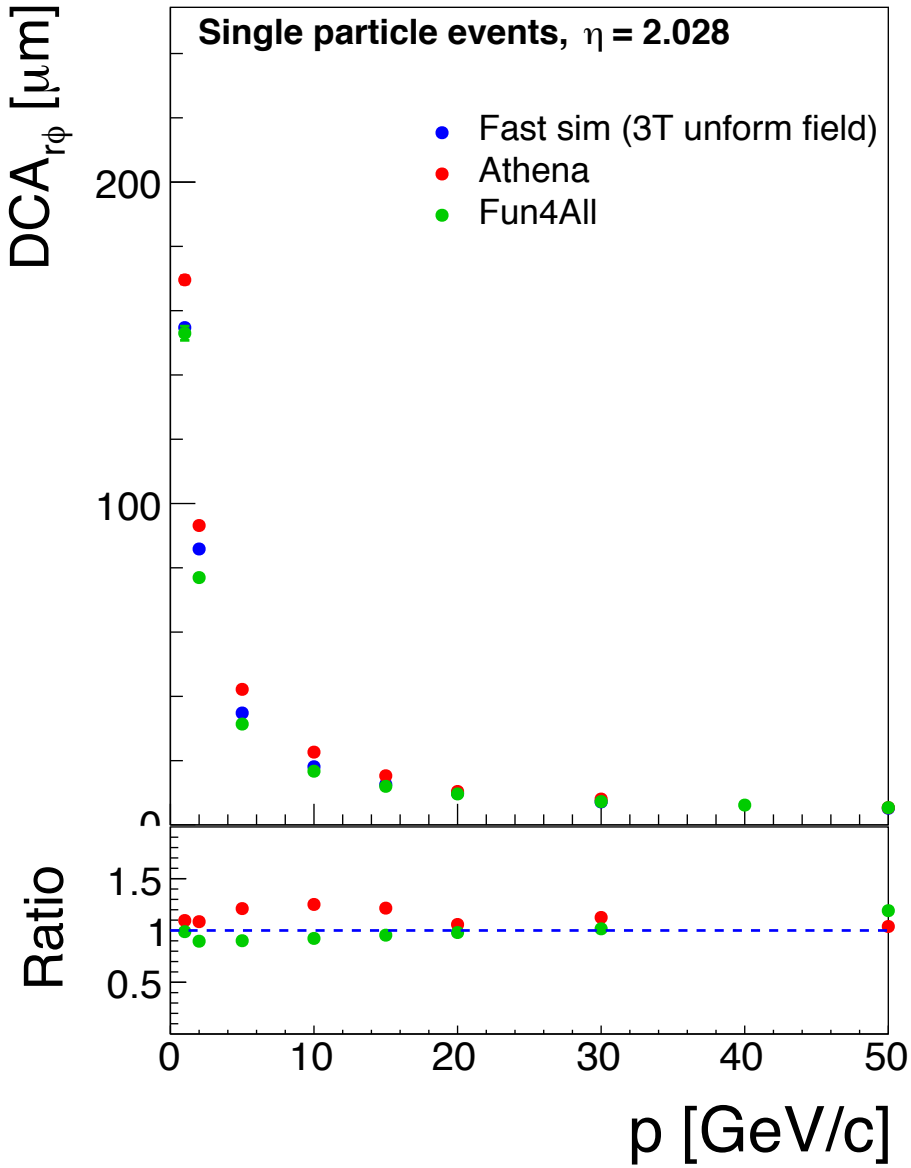


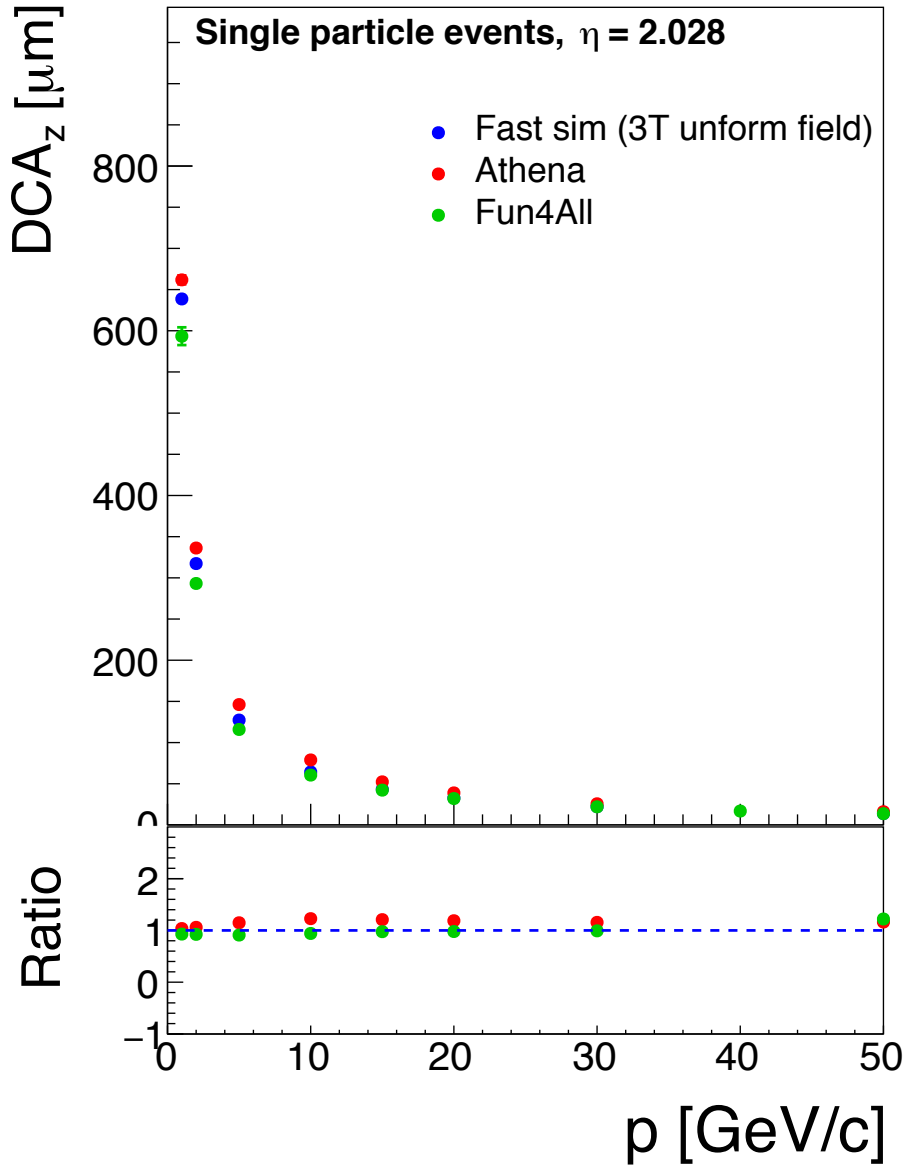
DCA comparison



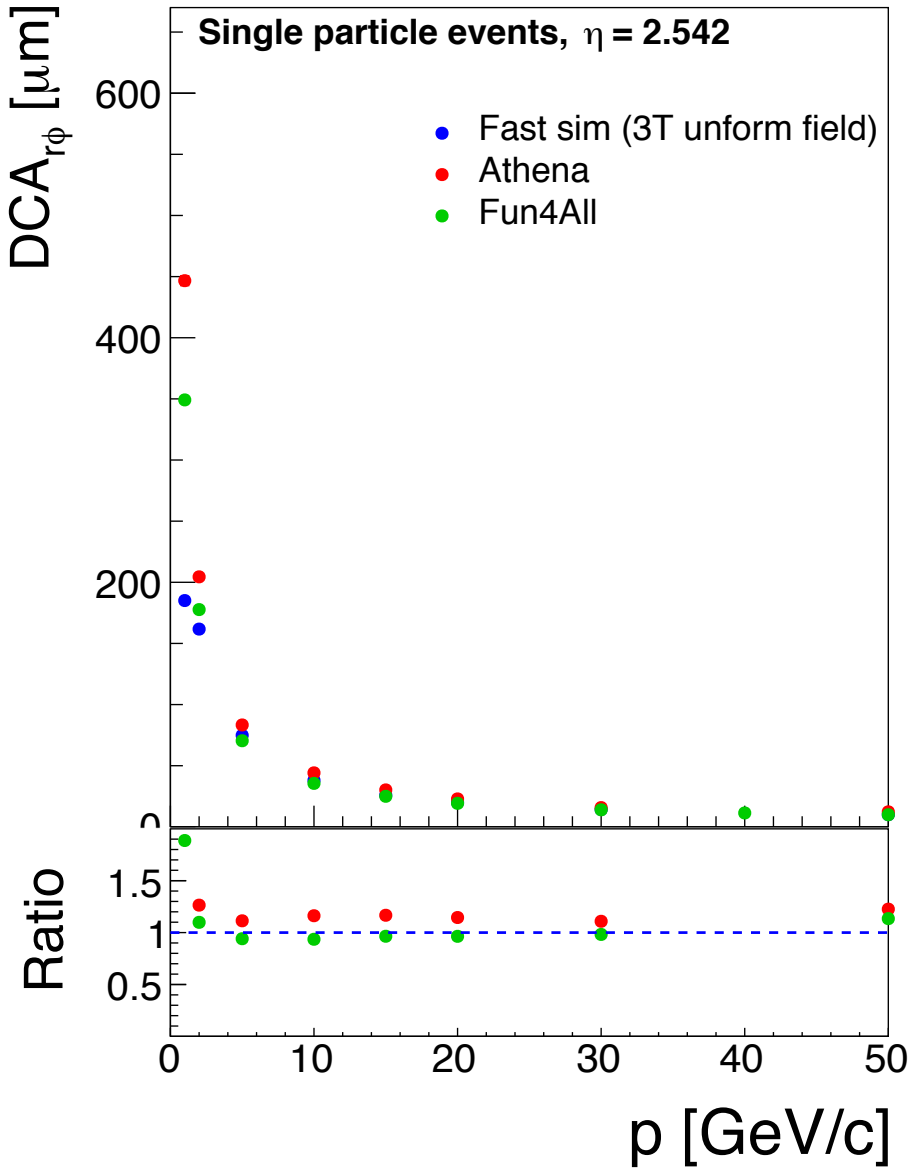


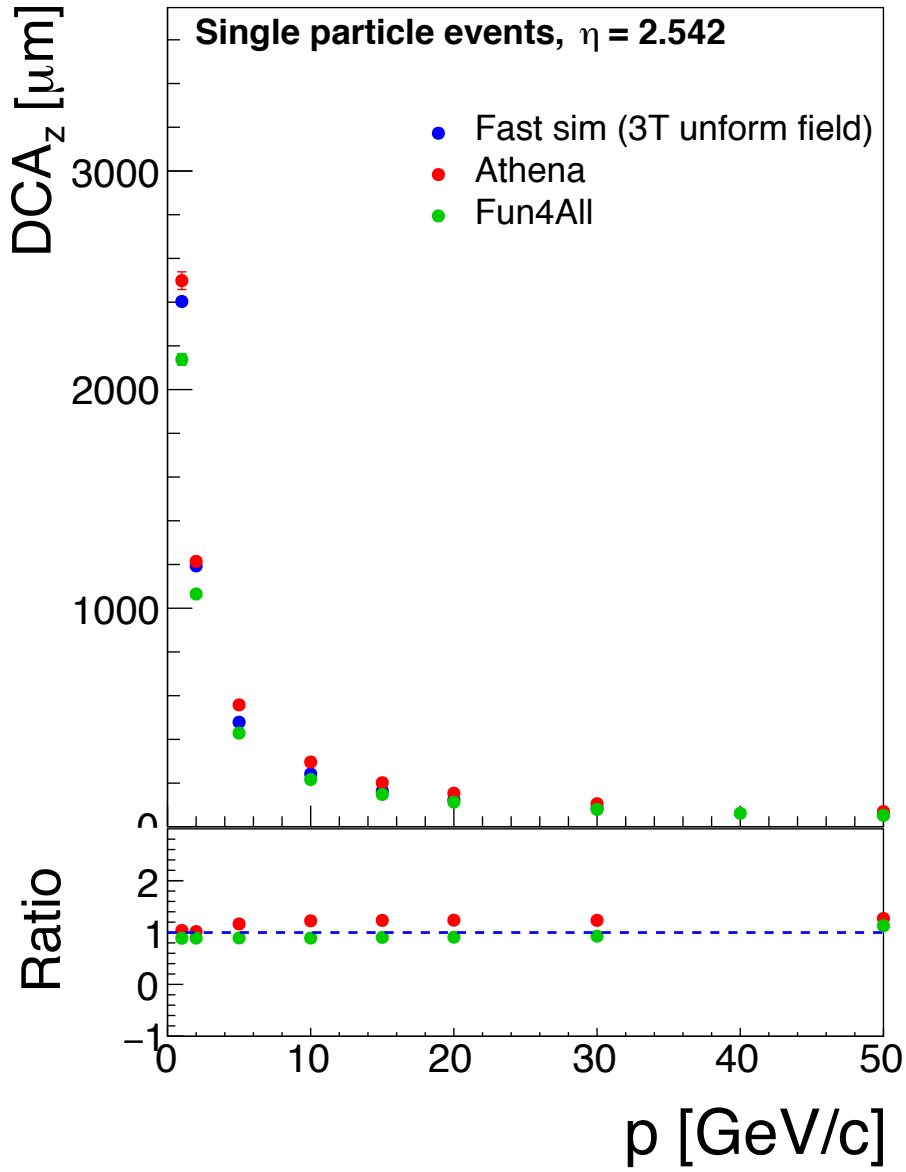
DCA comparison



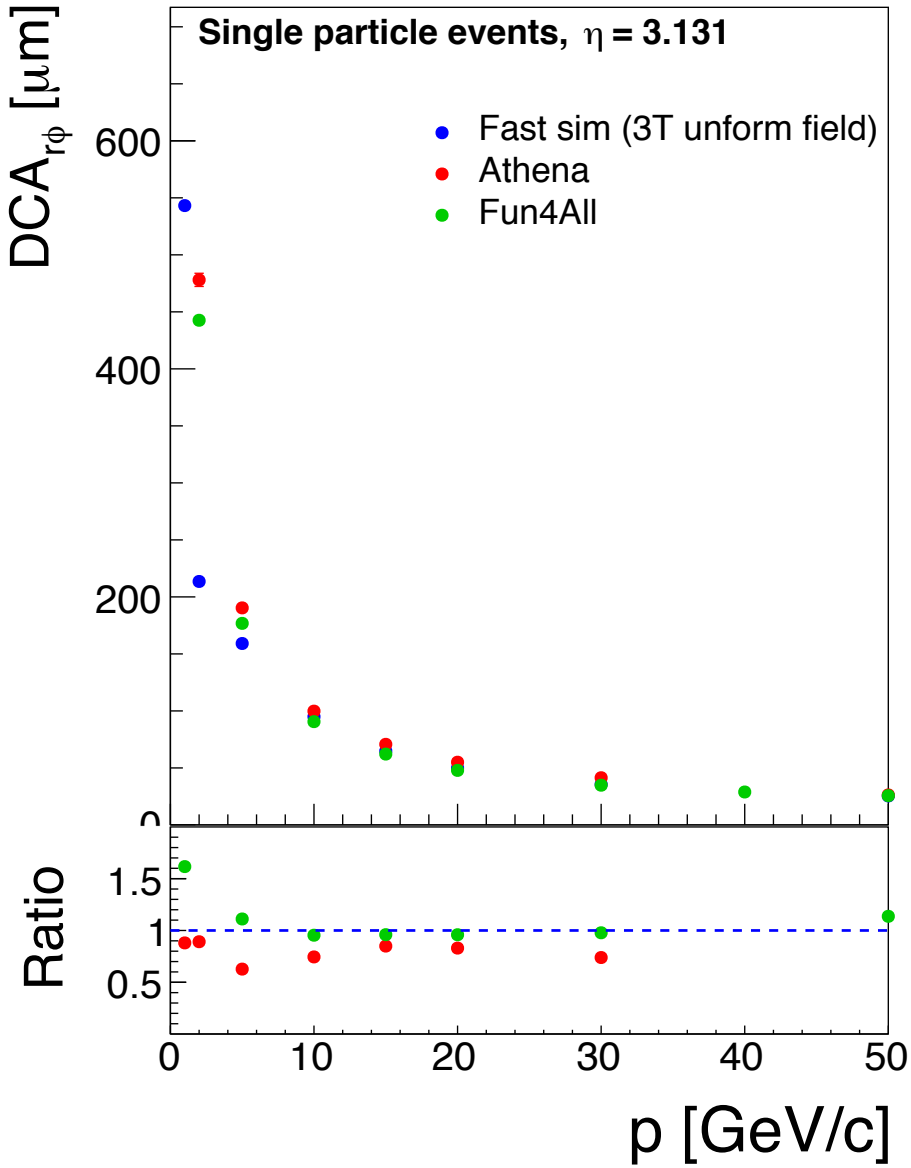


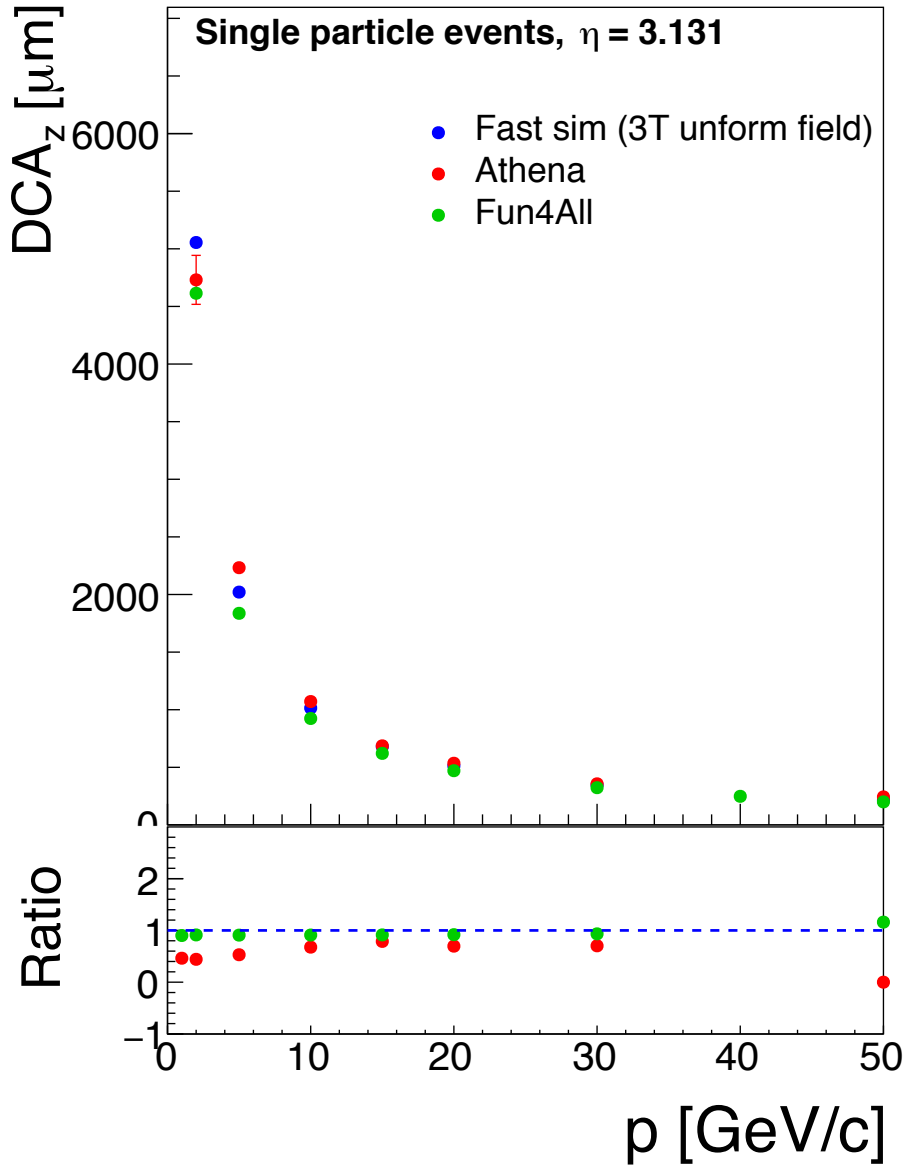
DCA comparison





DCA comparison





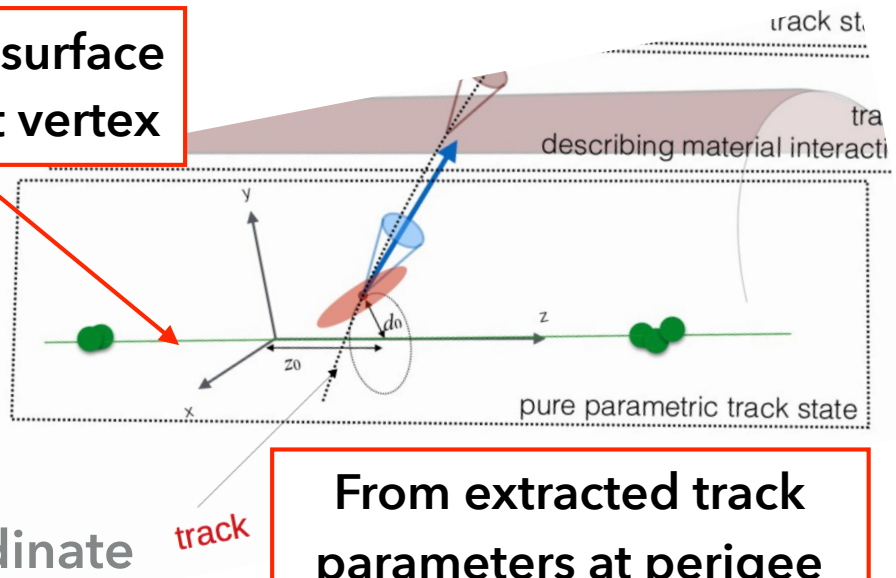
Summary

- Overall the difference is with factor of 2
  - Better agreement in $DCA_{r\phi}$ than DCA_z
  - Better agreement in forward rapidity
  - Better agreement in very low p (~1GeV) and very high p (~50GeV)
- Can be material effect?
- Currently hit smeared by pixel size rather than pixel size/sqrt(12)
- Different definition?

Single Track DCA calculation

- Approach 1:
  - Use track paramters (d_0, z_0) at Perigee surface
  - Use z axis as reference
- Aprroach 2:
  - Convert track parameters to global coordinate
  - Use primary vertex point as reference

Perigee surface at event vertex



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