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Update on the angular resolution of the tracking system

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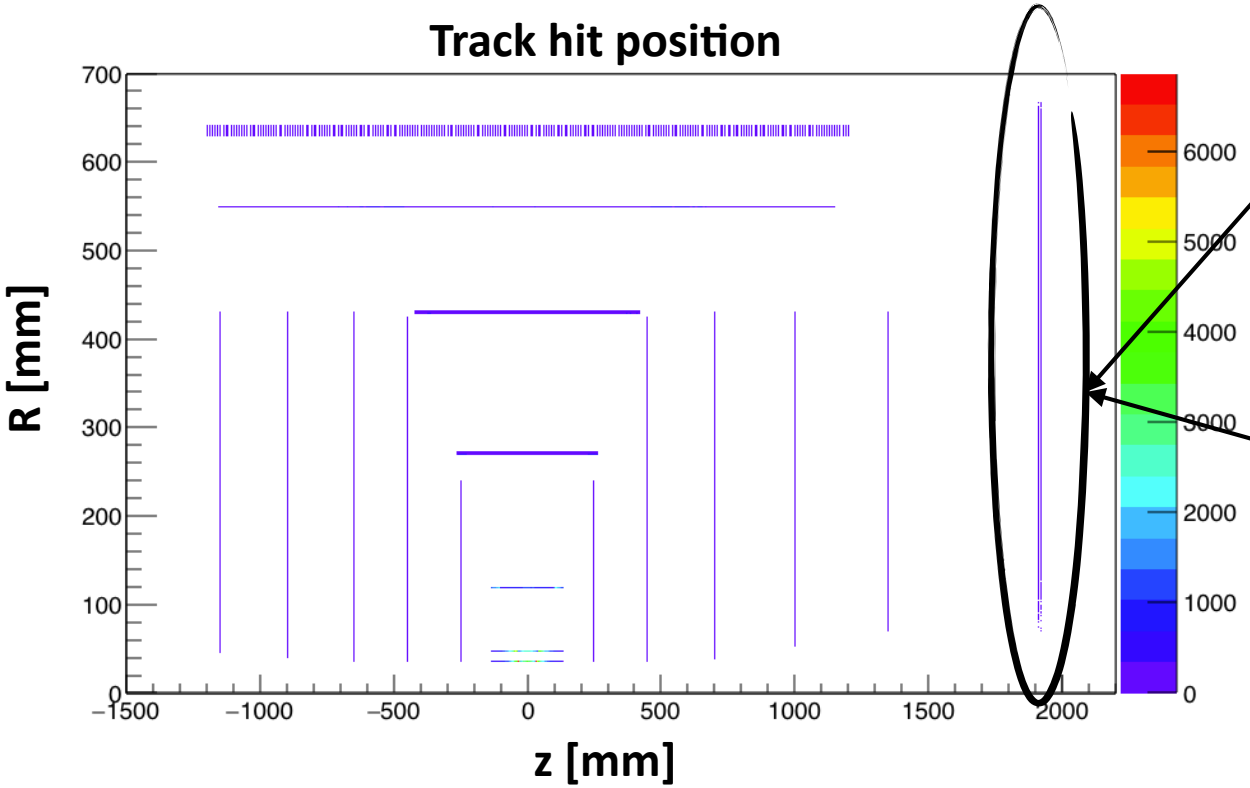
EPIC tracking meeting, 12/08/2022

Tagged geometry + new MARCO field map

- Geometry tag: Brycecanyon
  - 5 barrel silicon: spatial resolution 10μm/sqrt(12), r = 3.6, 4.8, 12, 27, 42cm
  - 1 barrel MPGD: spatial resolution 150μm, r = 55cm
  - 1 barrel TOF: spatial resolution 30x3000μm, r = 64.6cm
  - 10 endcap silicon: spatial resolution 10μm/sqrt(12), z = -115, -90, -65, -45, 25, 25, 45, 70, 100, 135cm
  - 1 endcap TOF: spatial resolution 30μm, z = 192cm



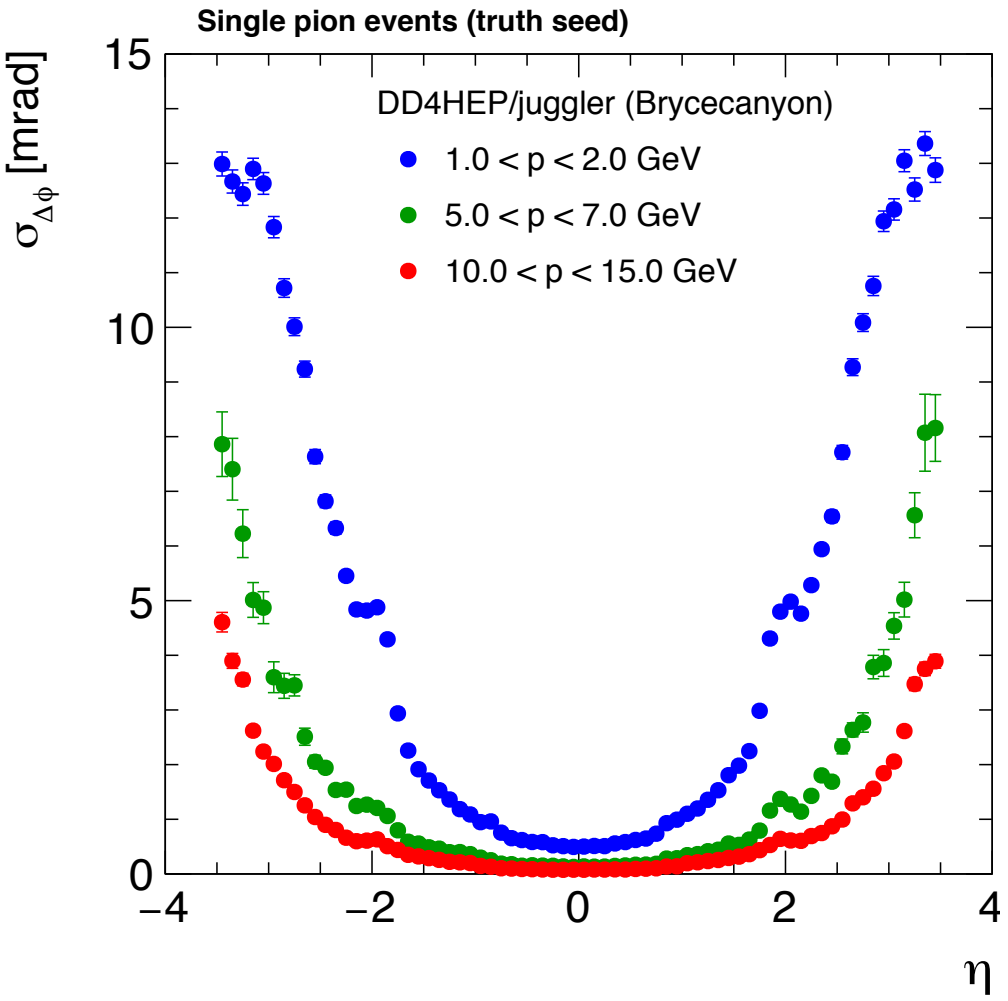
NOT in track reconstruction with juggler (code crushes at random event)

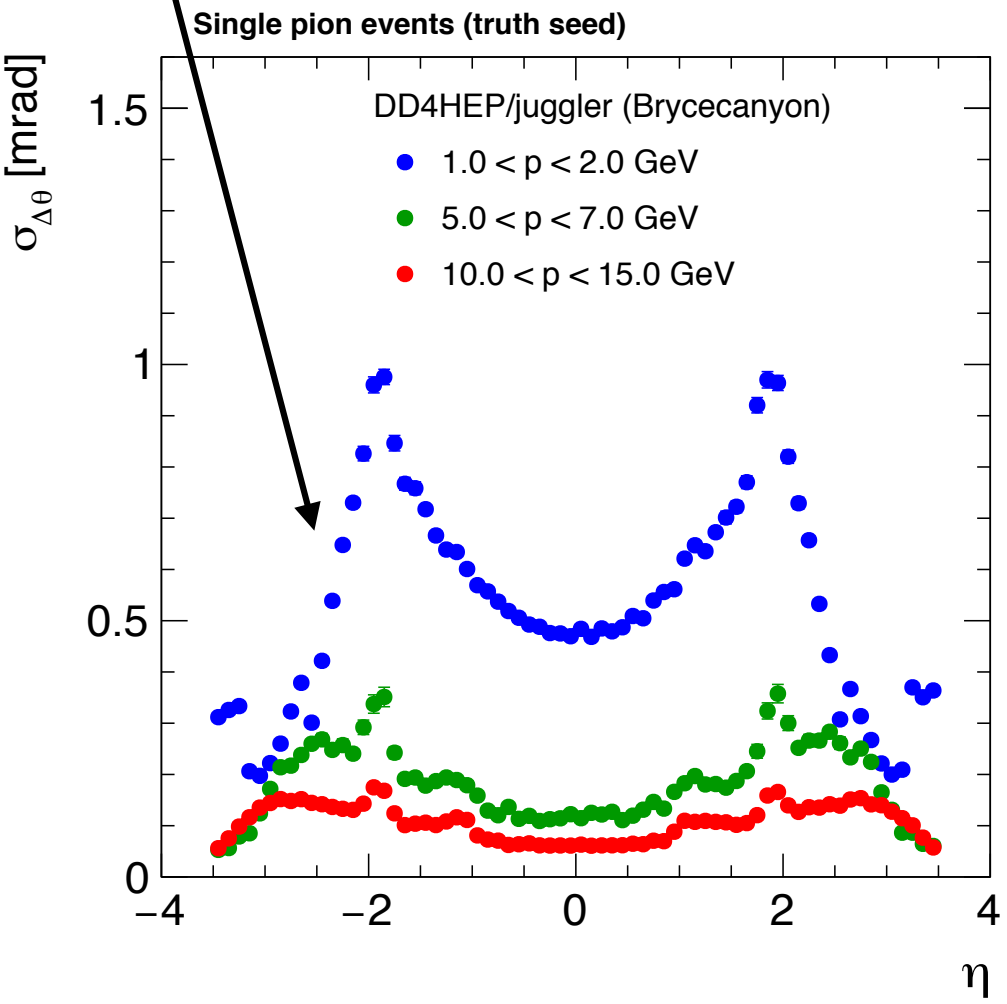
NOT in track reconstruction with EICrecon

Brycecanyon + new MARCO field map

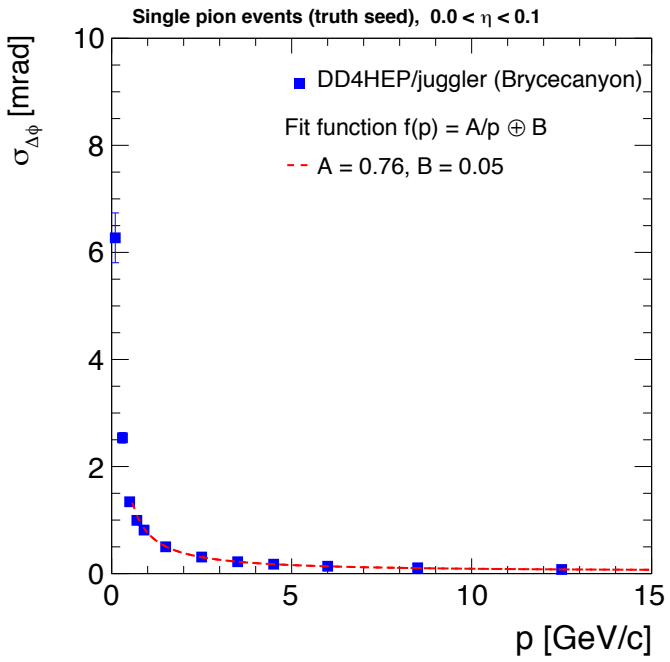
- Caveat: endcap TOF hits at z = 192cm not included in the track reconstruction

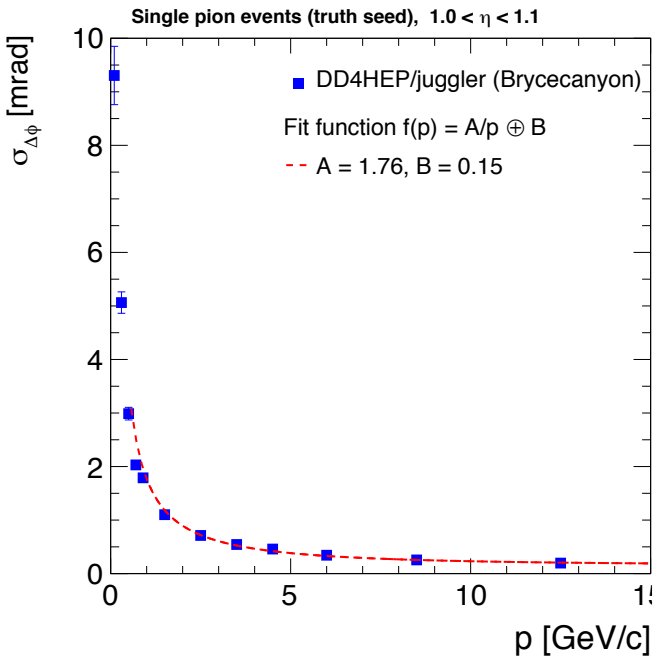
Δθ resolution not reliable for the lowest momentum range ar back/forward raidity (see slide 3)

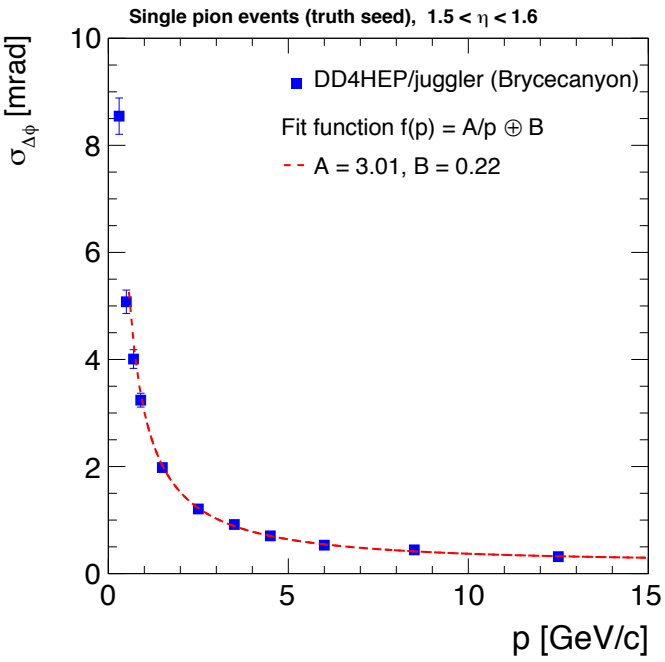


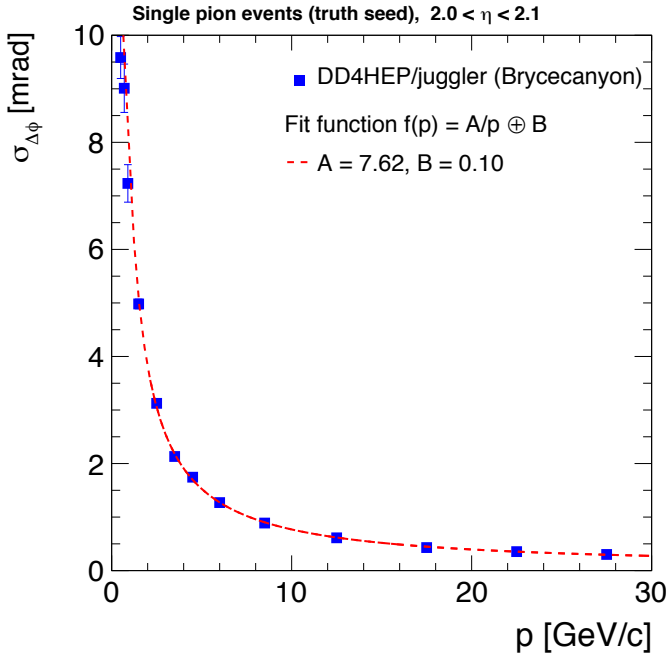


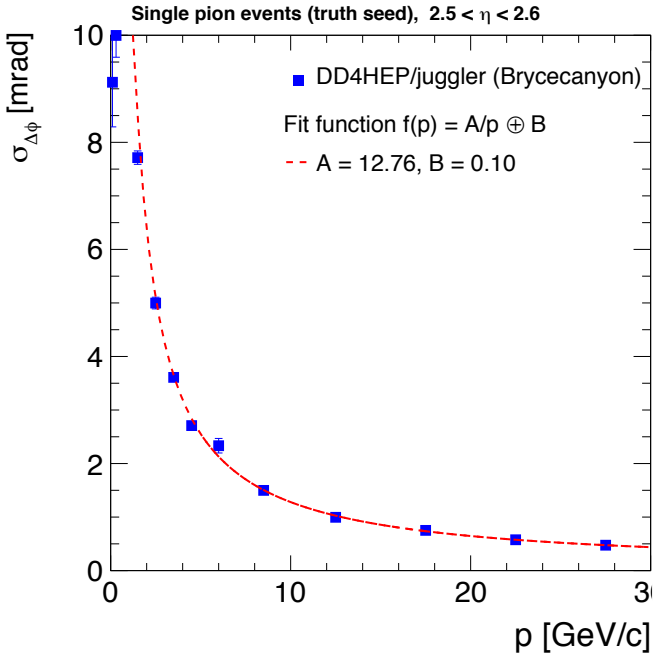
Azimuthal angule resolution (Δϕ resolution)

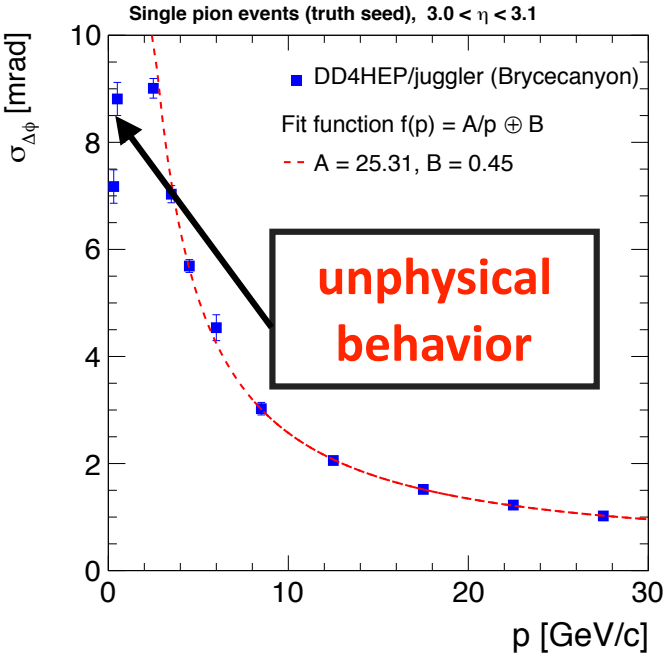




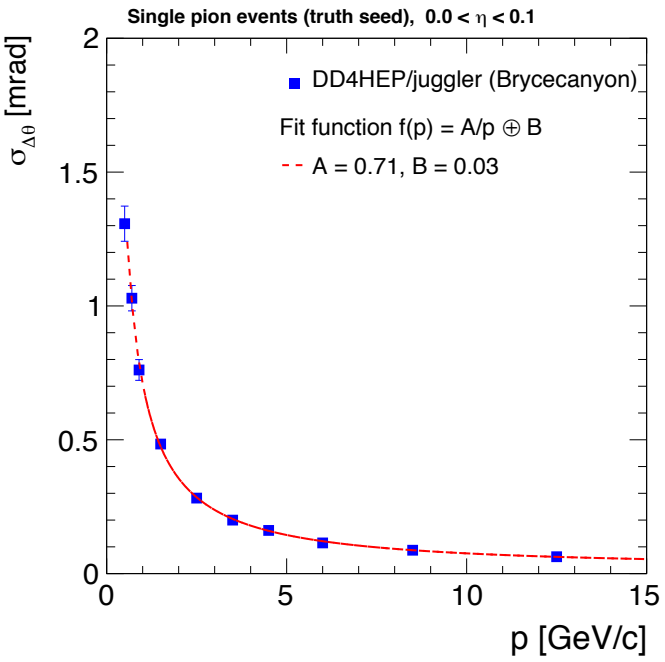


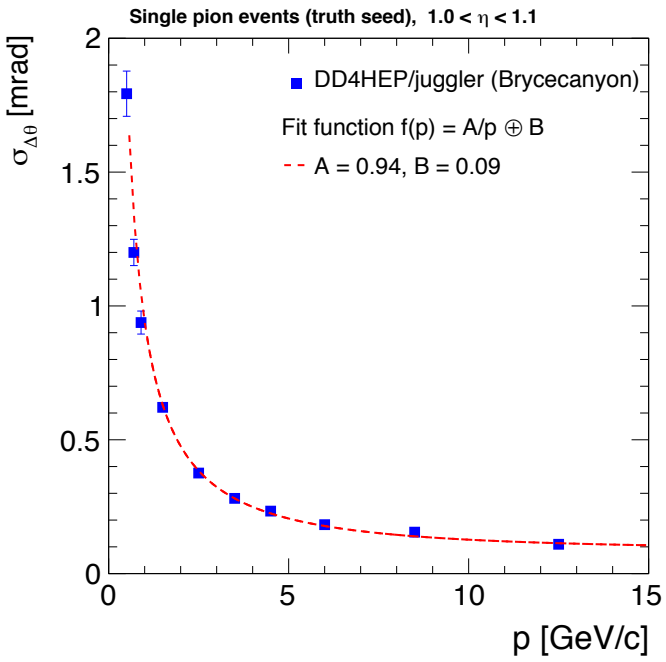


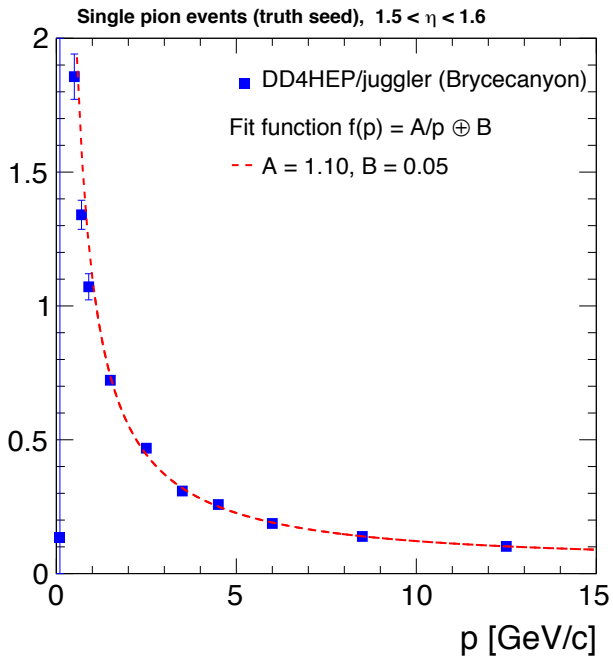


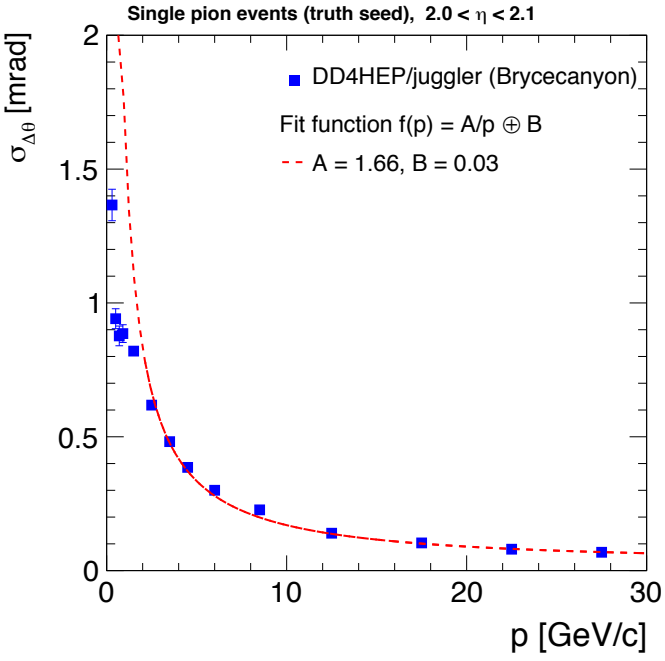


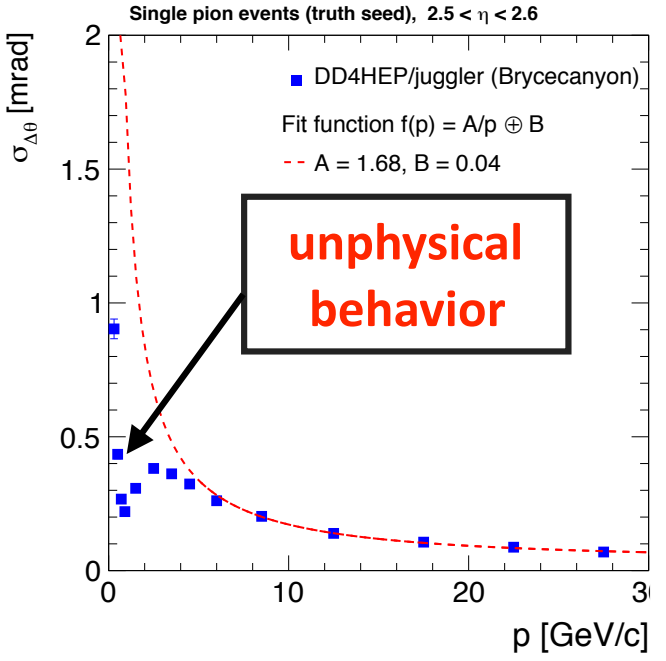
Polar angule resolution (Δθ resolution)

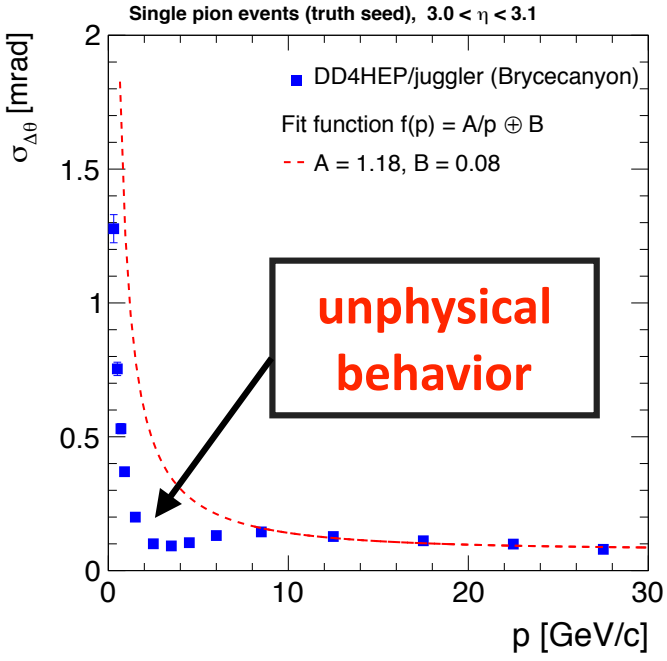




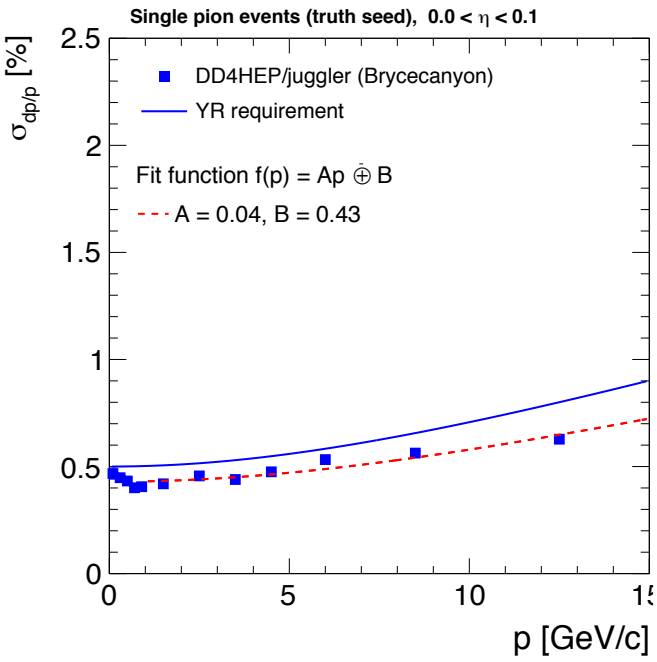


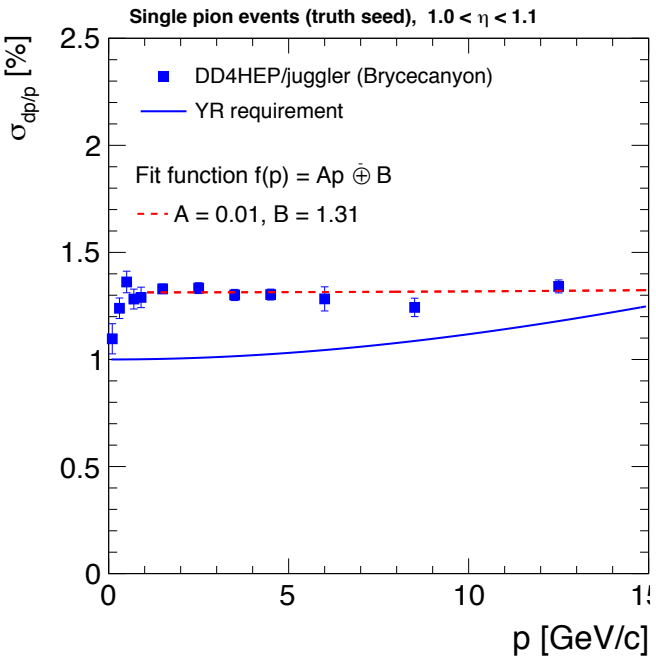


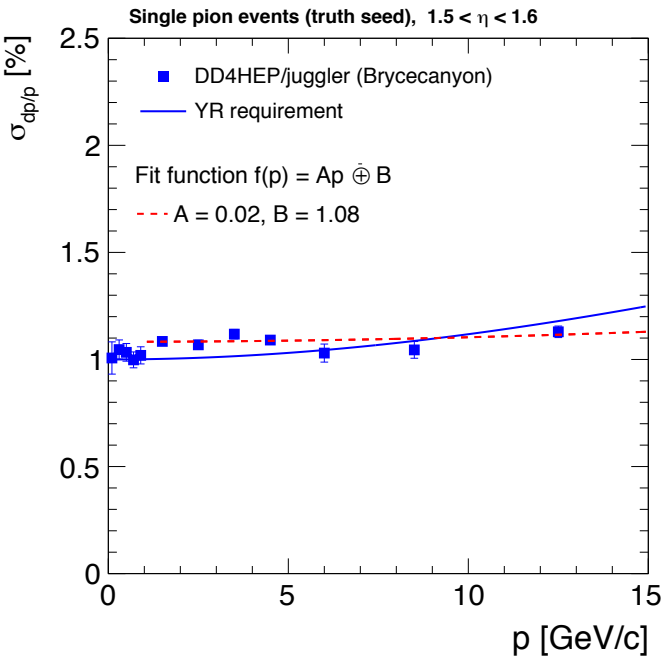


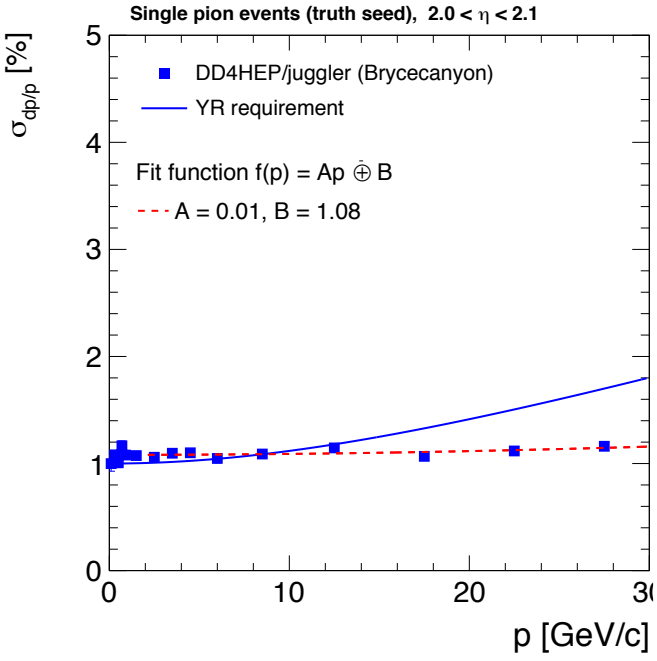


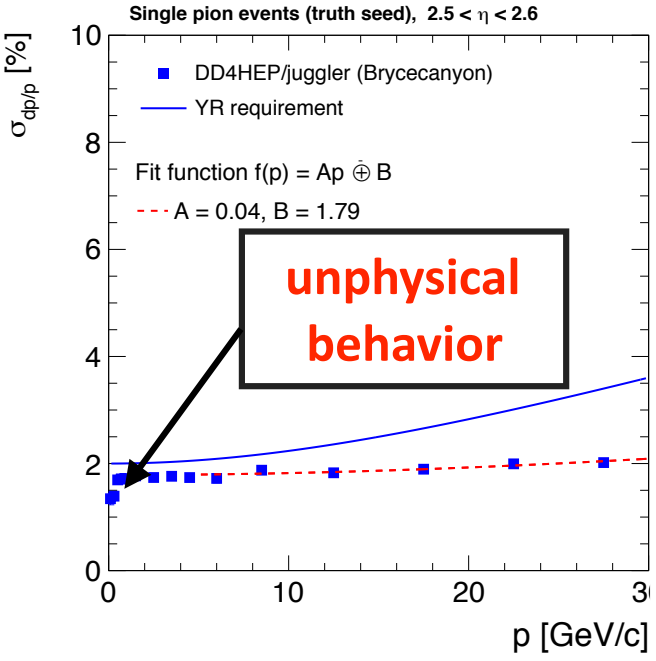
Polar angule resolution (Δp/p resolution)

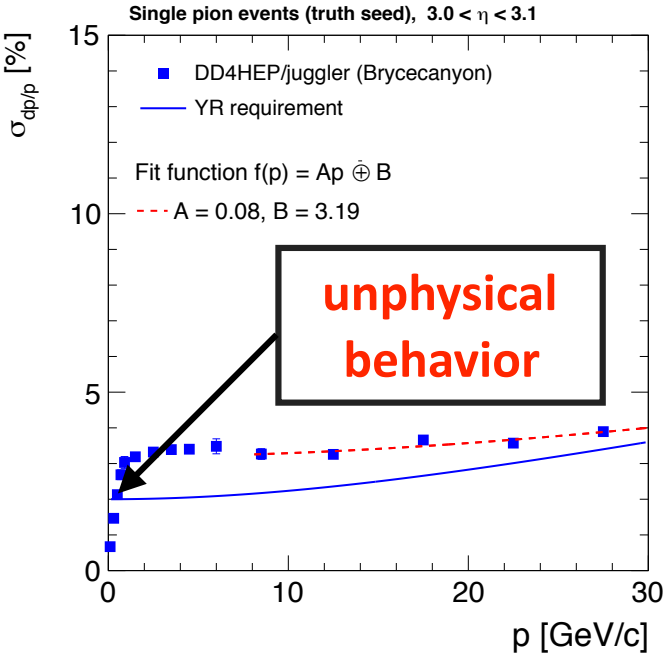










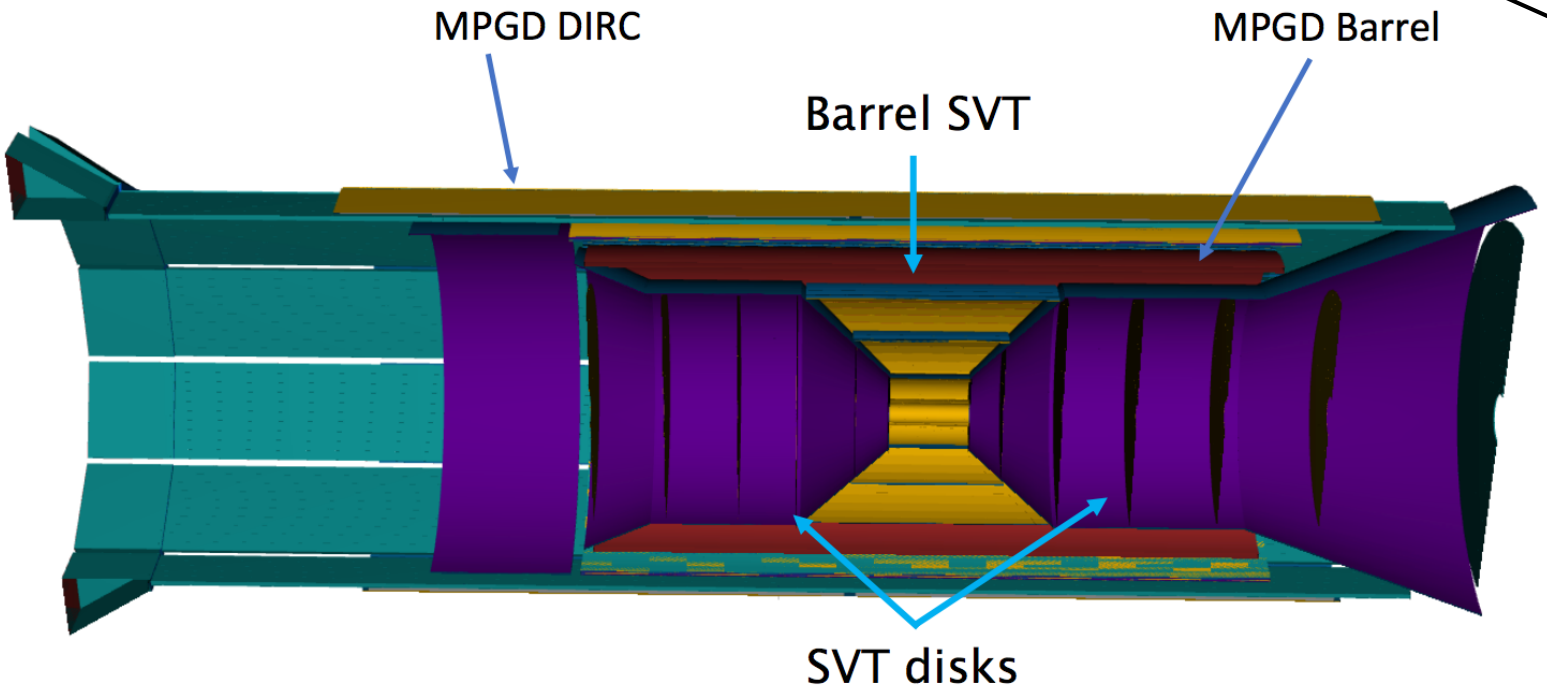


Arches and Brycecanyon tracking geometry difference

Slides by the tracking WG at GDI meeting: https://indico.bnl.gov/event/17723/

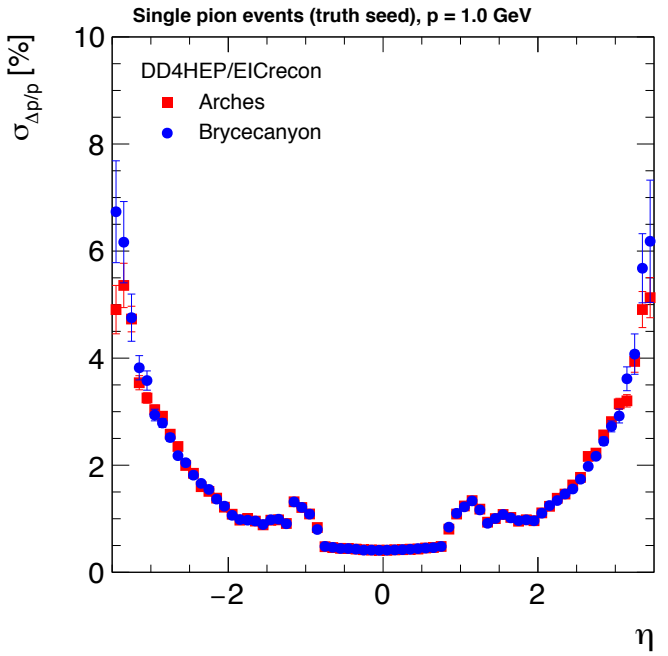
- Two configurations: Arches and Bryce Canyon.
- The SVT is the same in both configurations.
  - Consists of barrel layers, disks in forward and backward region.
- Two configurations of MPDG barrel layers.
  - Arches: one MPGD layer after outermost silicon layer, before TOF (MPGD barrel).
  - Bryce Canyon: MPGD barrel + MPDG layer right before DIRD (MPGD DIRC).

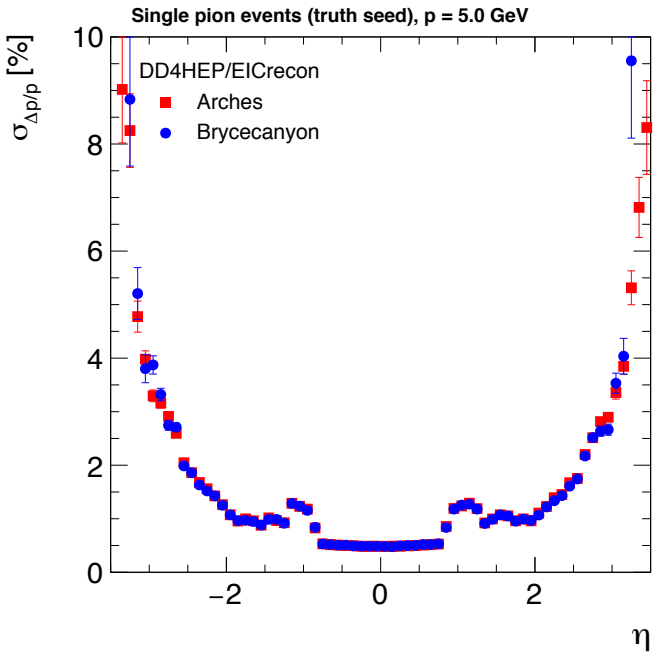
swapped

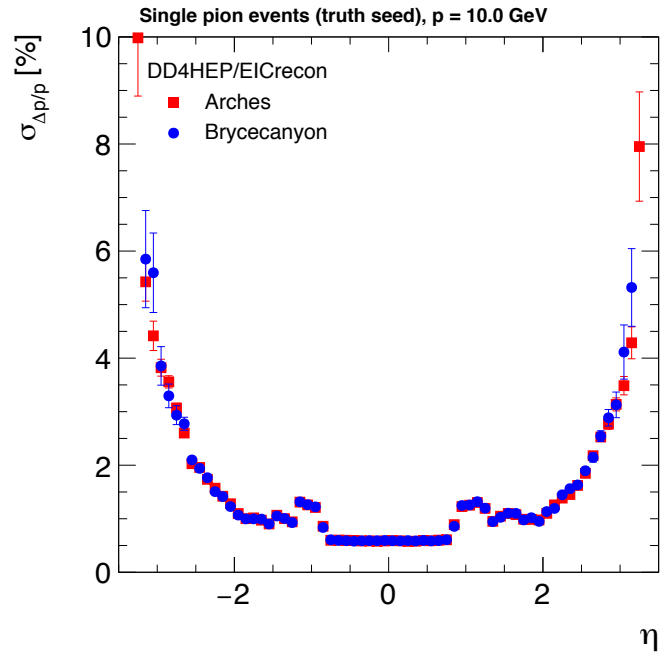


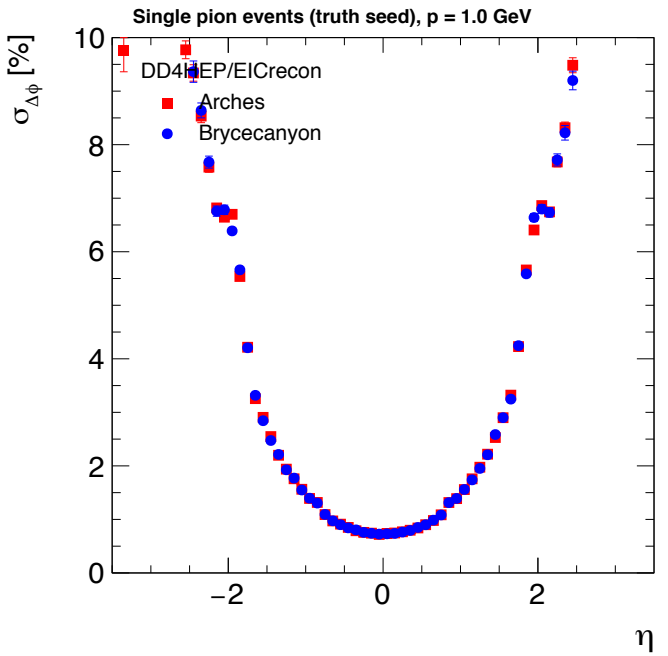
Currently not included in track reconstruction

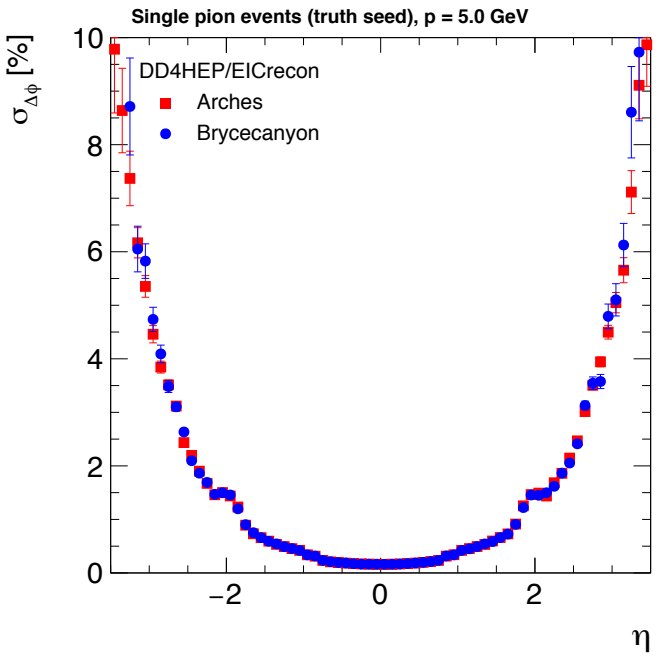
Comparison between Arches and Brycecanyon

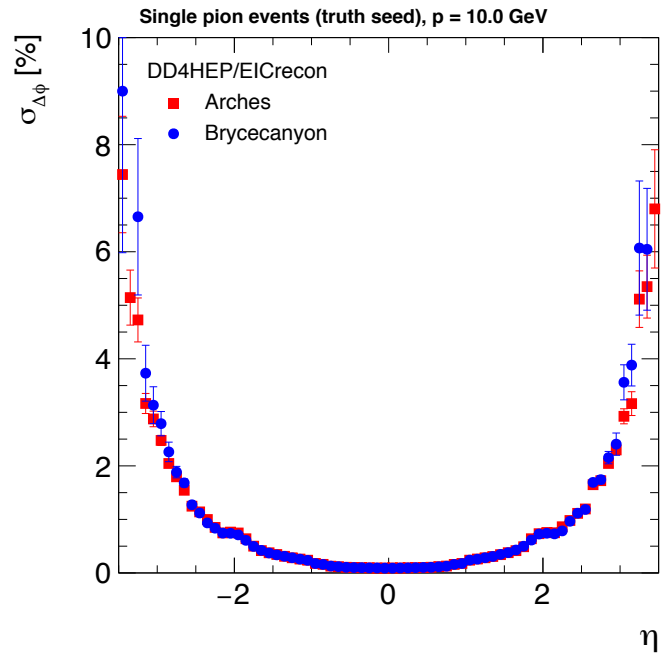




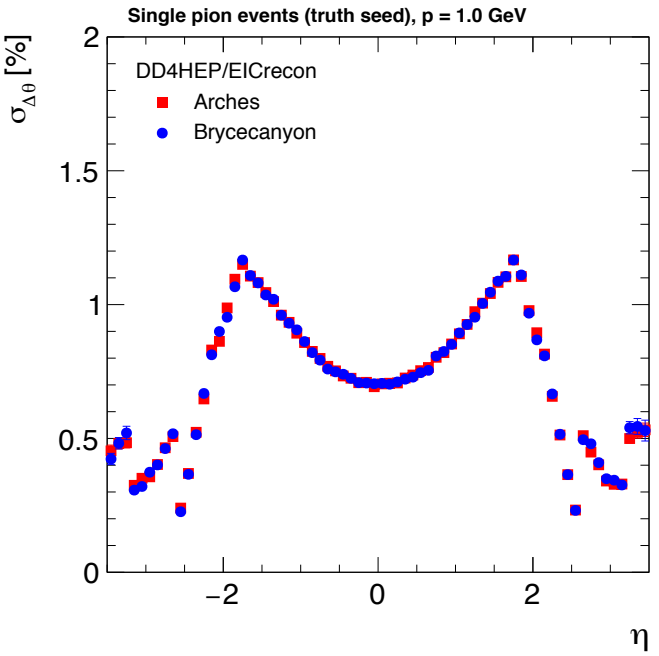


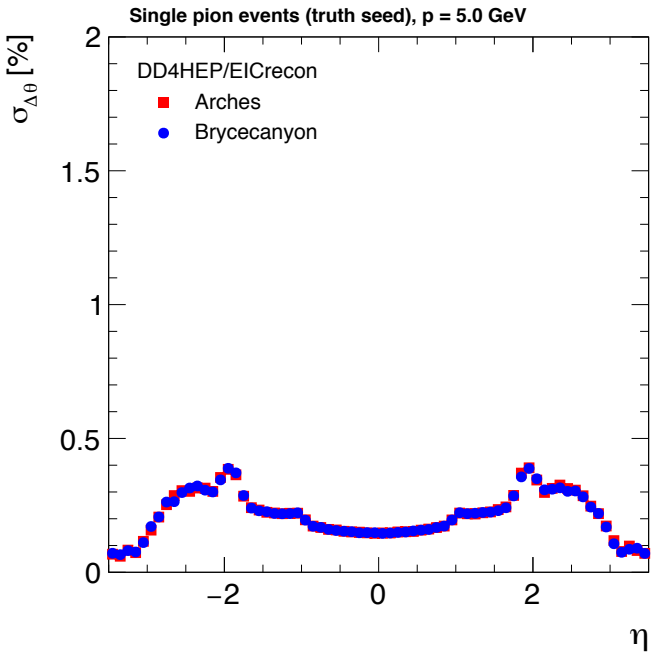


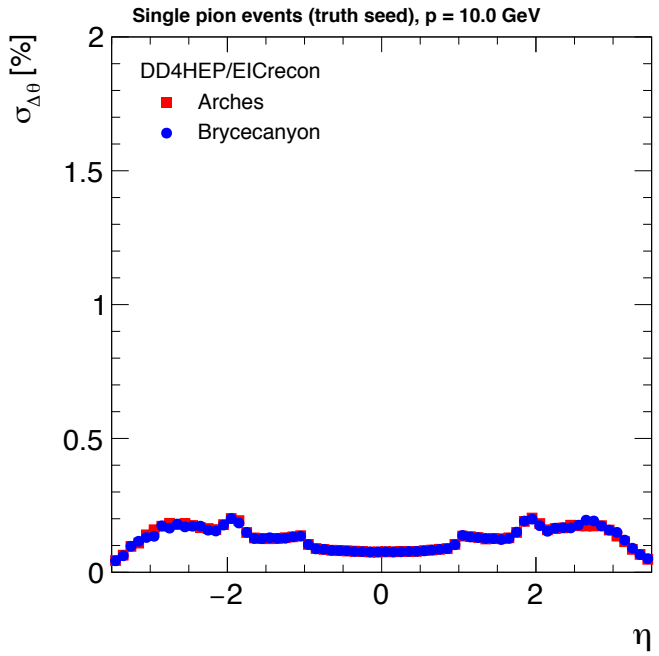




Comparison between Arches and Brycecanyon







No performance difference between Arches and Brycecanyon in terms of momentum and angular resolution

Summary

- Looked at the angular resolution with the Brycecanyon geometry + new MARCO field map
  - Good resolution for $\Delta\phi$ and $\Delta\theta$
  - Unphysical behavior at low p range at forward/backward rapidity for $\Delta\theta$: better resolution toward lower p (also seen for momentum resolution)

- Compared momentum and angular resolution from Arches and Brycecanyon geometry
  - No performance difference

Resolution extraction details