ePIC-ToF simulation study

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MC samples

- Single particle gun for baseline PID performance
  - e-
  - K-
  - pi-
  - Need to extend proton

- Pythia ep collision sample -> Pythia
  - Official DIS for benchmark
    S3/eictest/EPIC/RECO/23.12.0/epic_craterlake/SIDIS/pythia6-eic/1.0.0/18x275/q2_0to1/
  - Own generated pythia sample

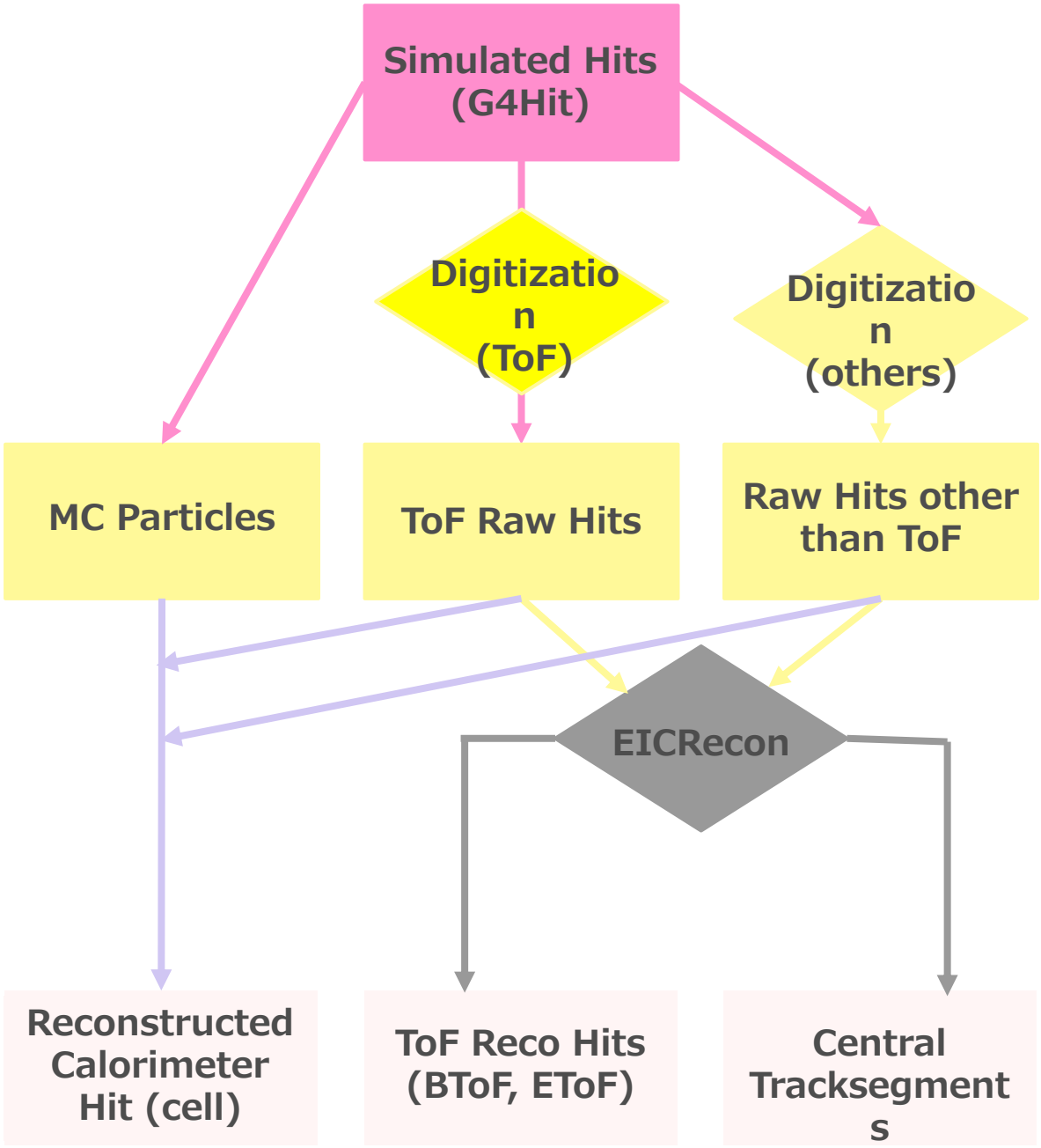
- Proton beam background -> BeamGAS
  - Official sample
    S3/eictest/EPIC/EVGEN/BACKGROUNDS/BEAMGAS/proton/pythia8.306-1.0/

Analysis procedure

- Track reconstruction via EICRecon

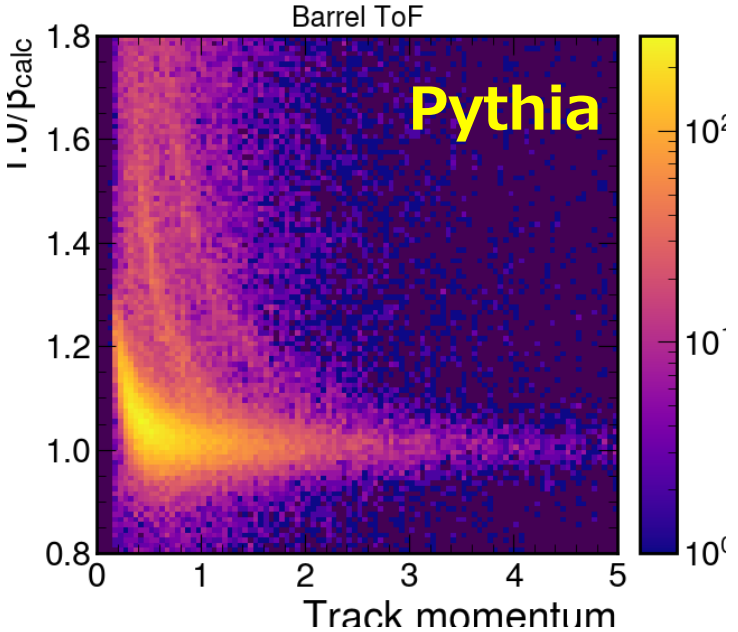
- Associate tracks and ToF hits
  - Find Track Segment on ToF
    - Based on track segment position
  - δR between ToF hits and tracks
    - $\delta R < 1.0$
  - Calc. β from:
    - Trackpathlength
    - ToF Hit time

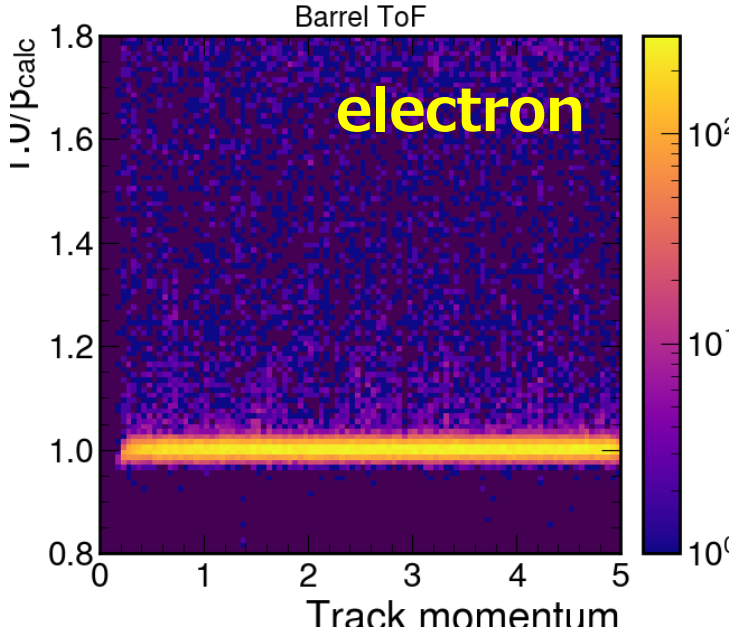
- Done by Kyohei-san

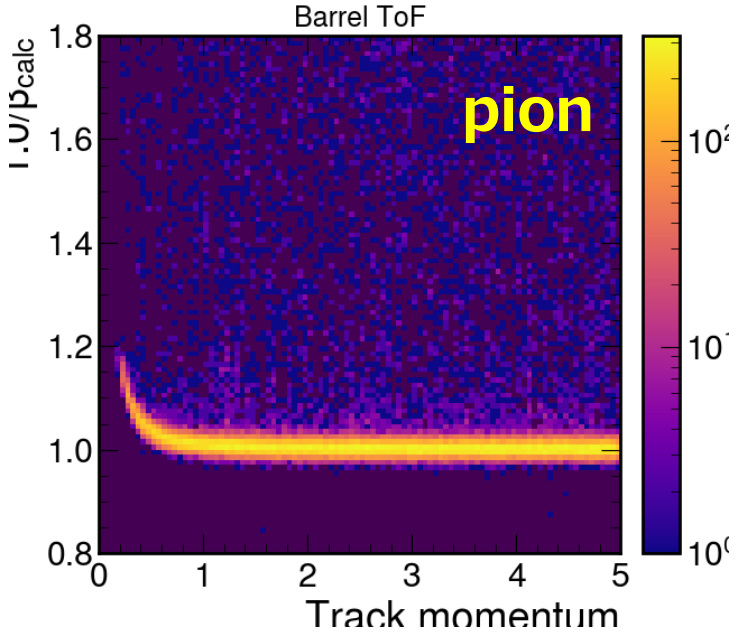


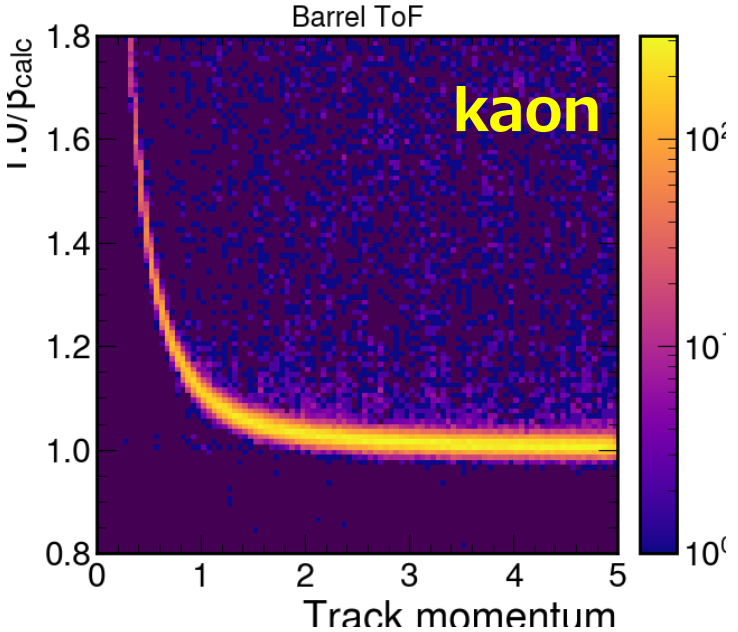
β vs track momentum

- Results from the Pythia sample looks a bit blurry than single particle gun?
  - But we can identify the lines
  - Next: Quantitative evaluation of PID performance

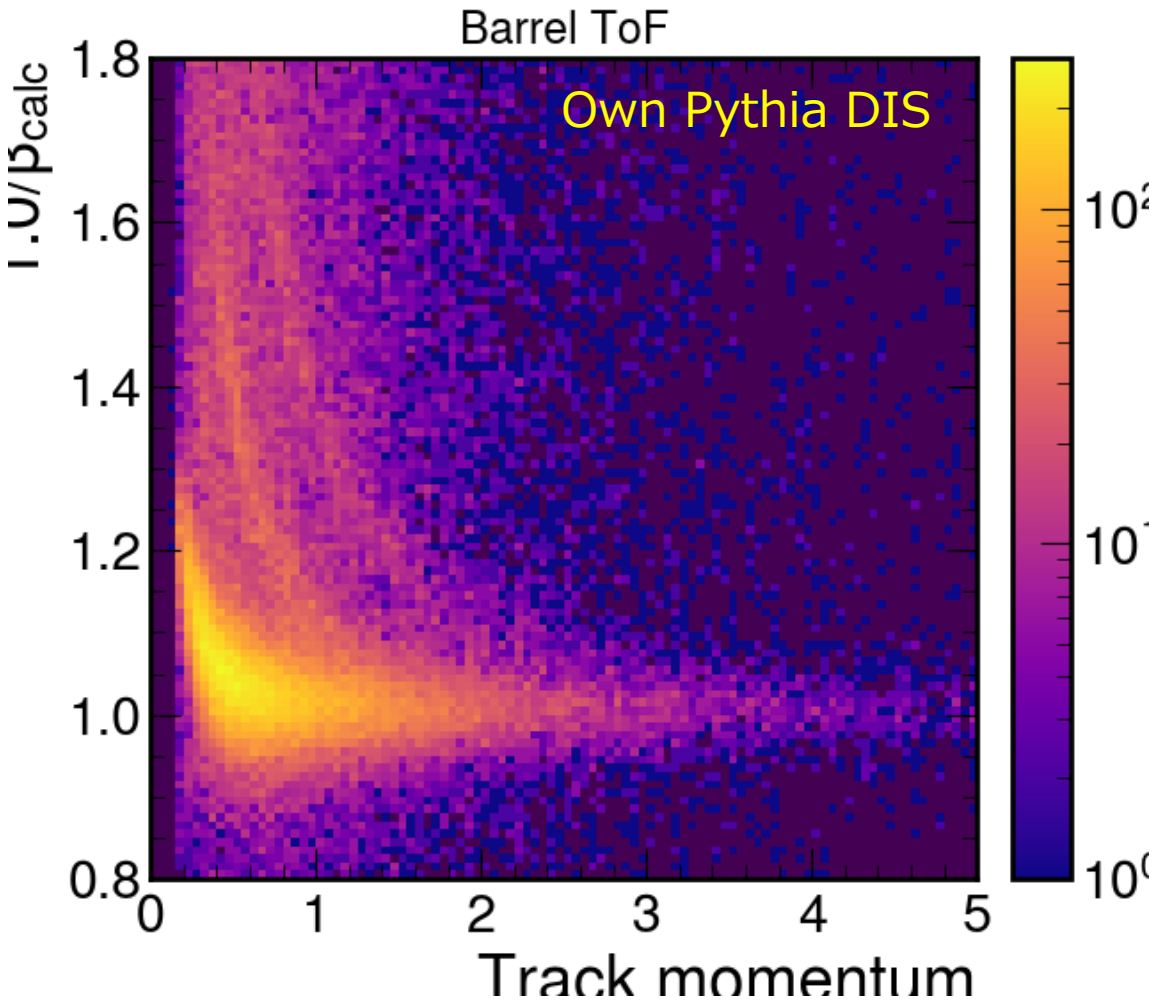


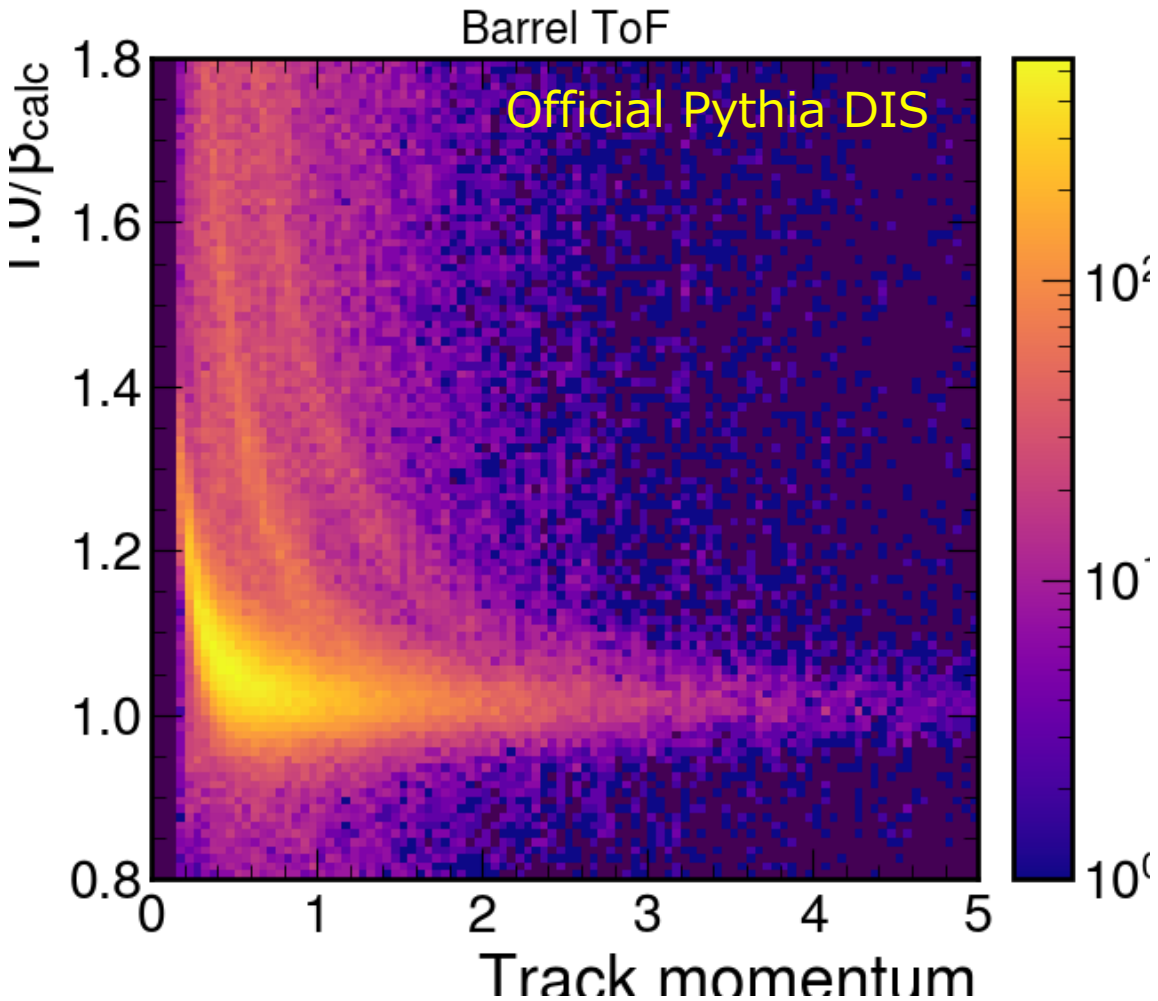






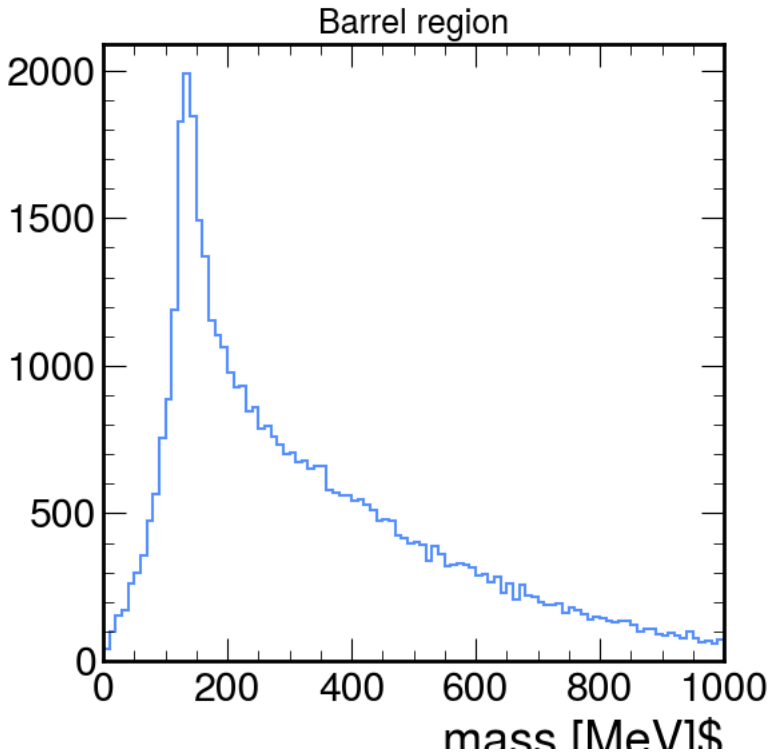
Own Pythia DIS v.s. Official Pythia DIS



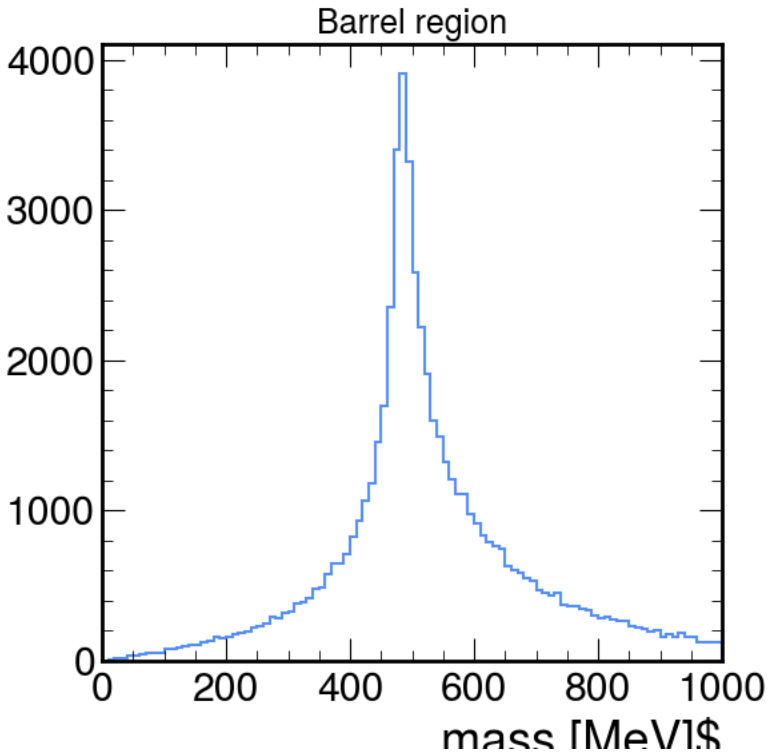


calculated mass distribution

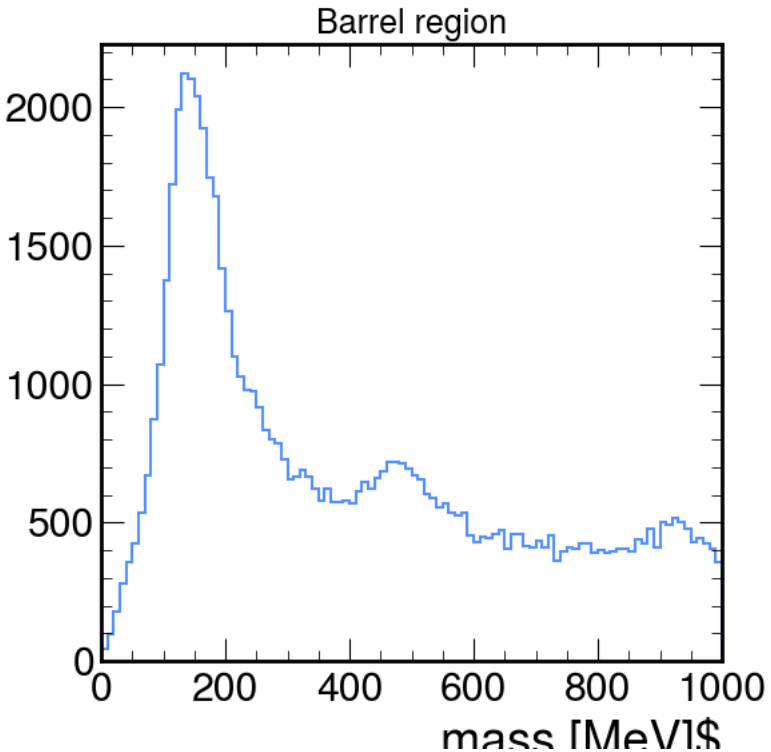
Single pion



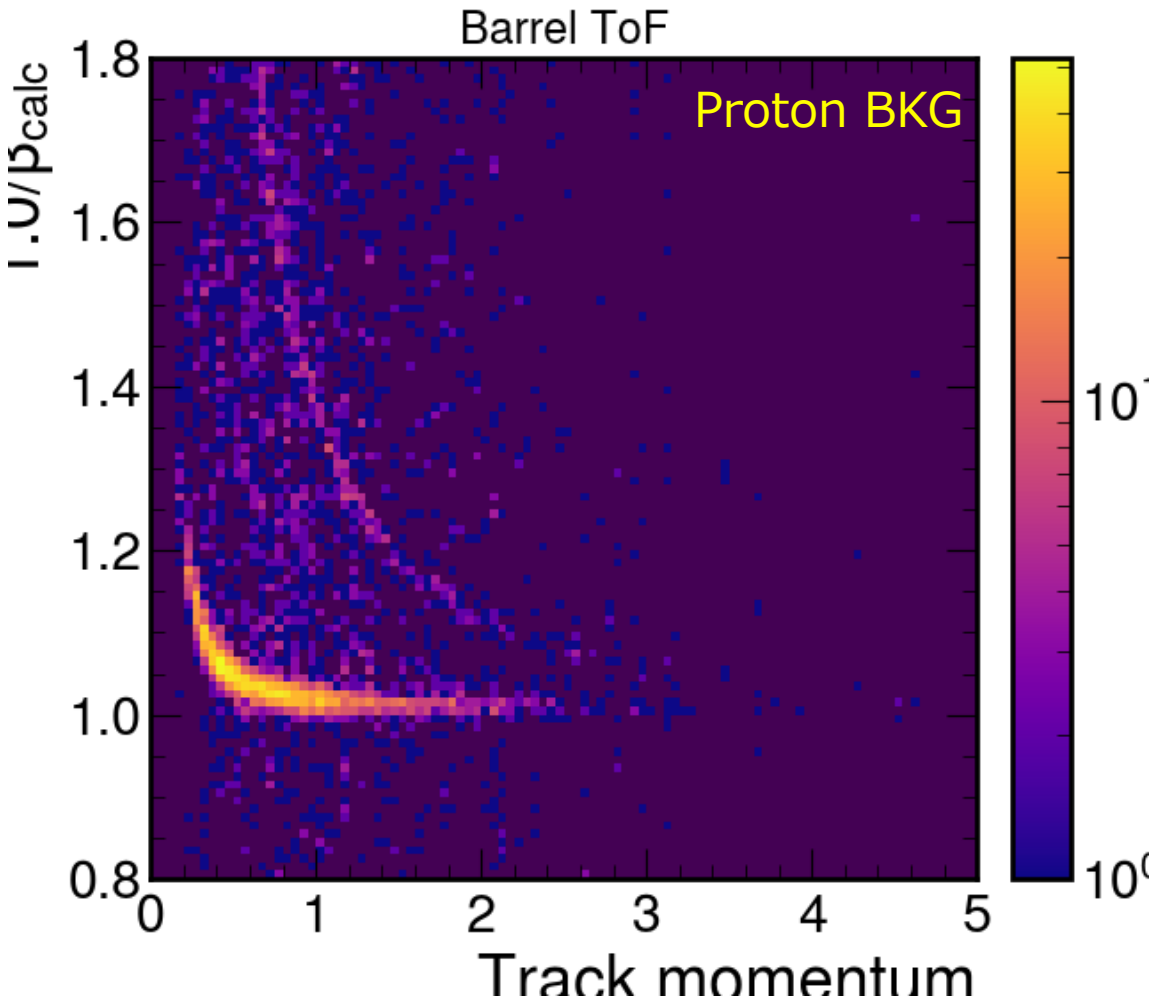
Single Kaon



Pythia DIS (Own)



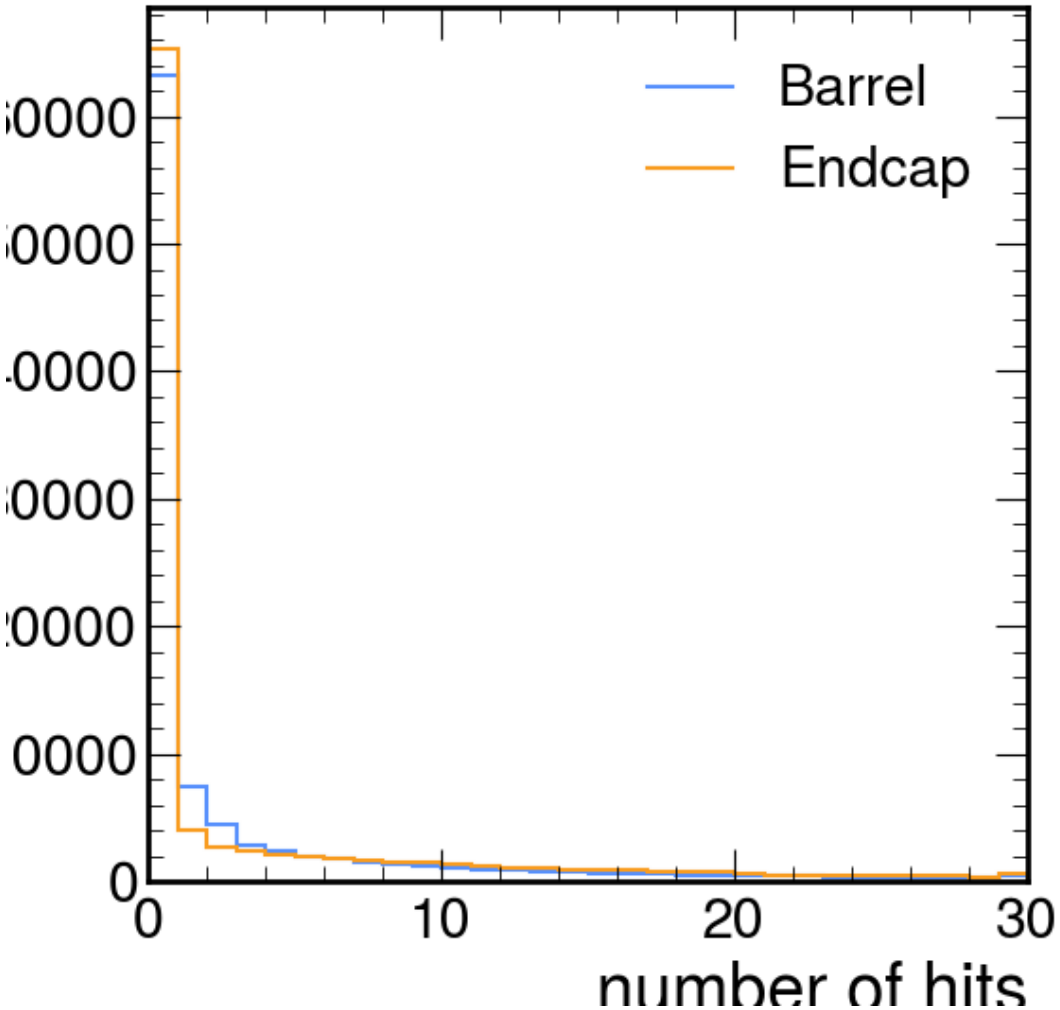
Proton BKG

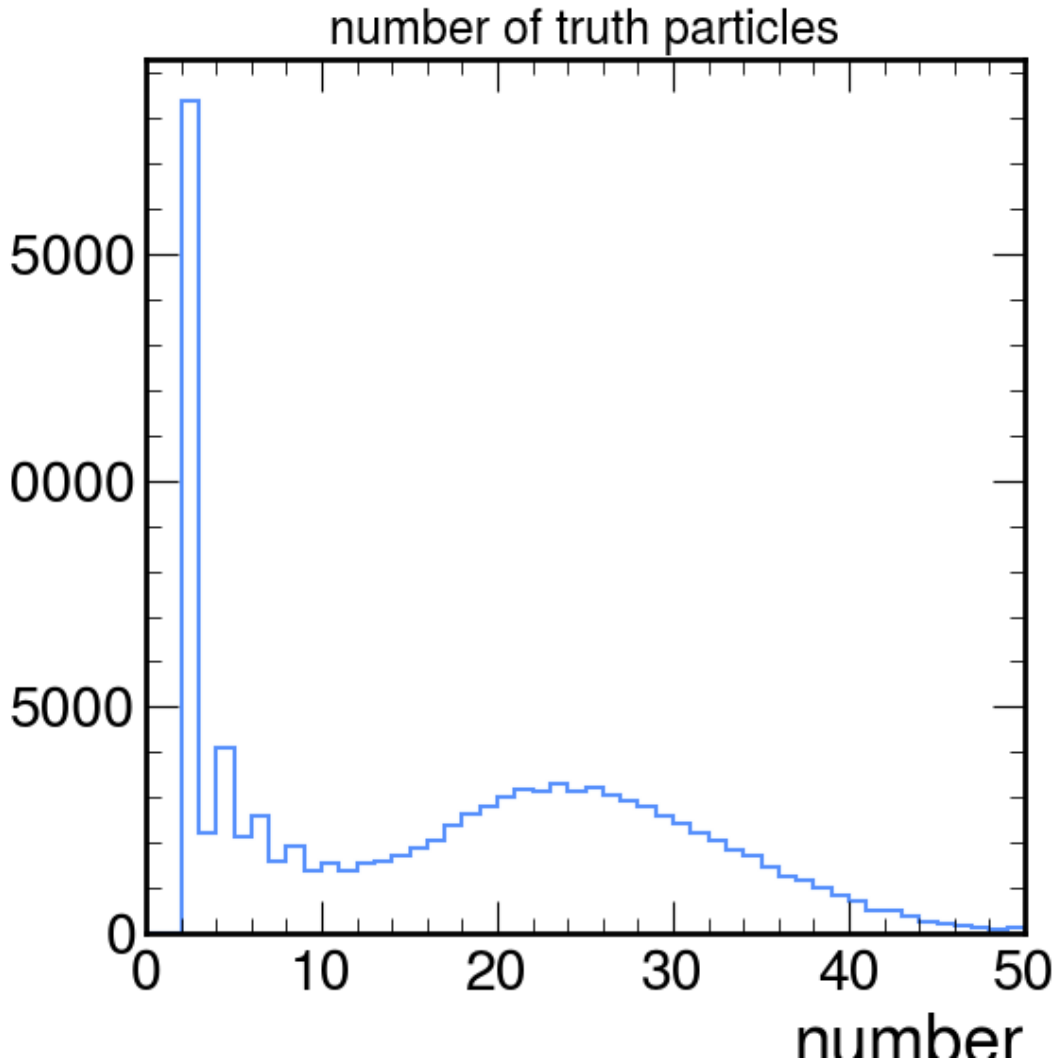


- Clearly see some lines

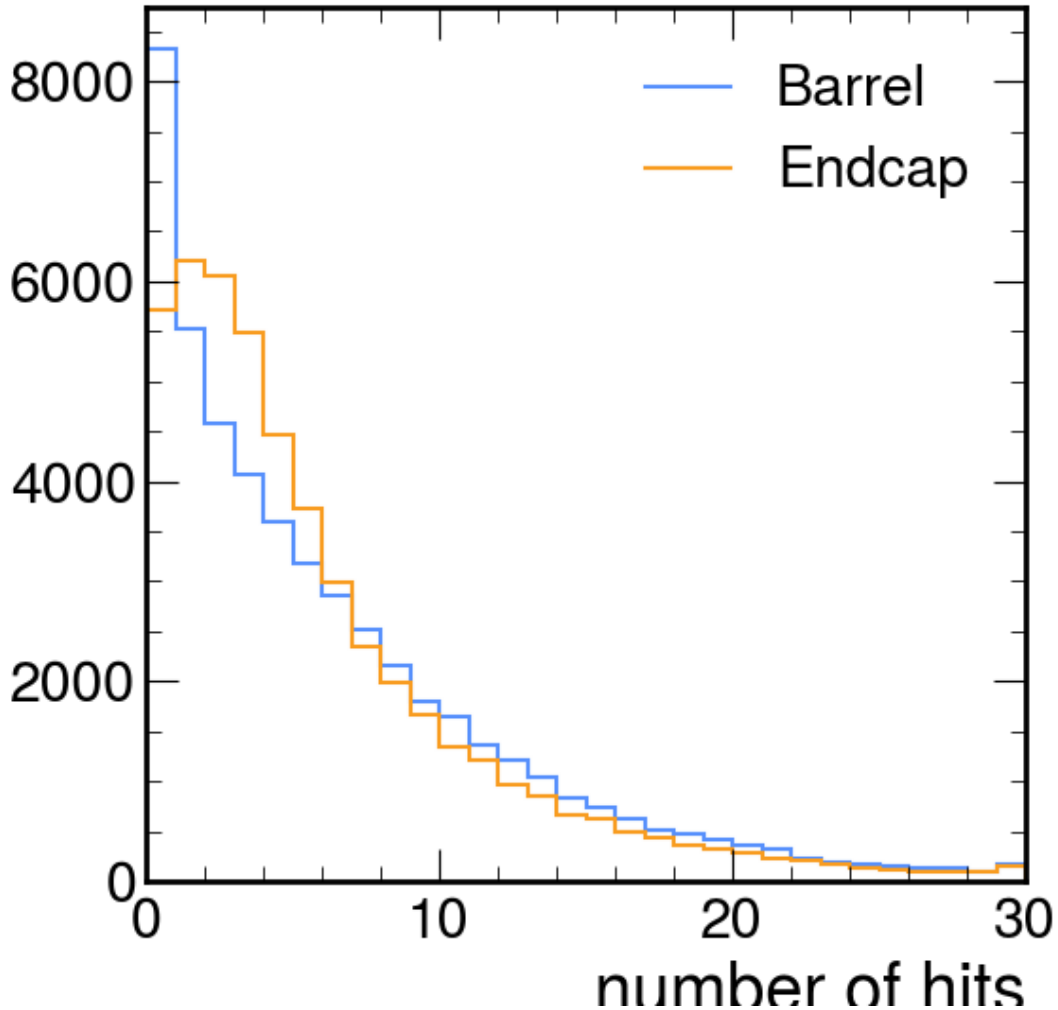
backup

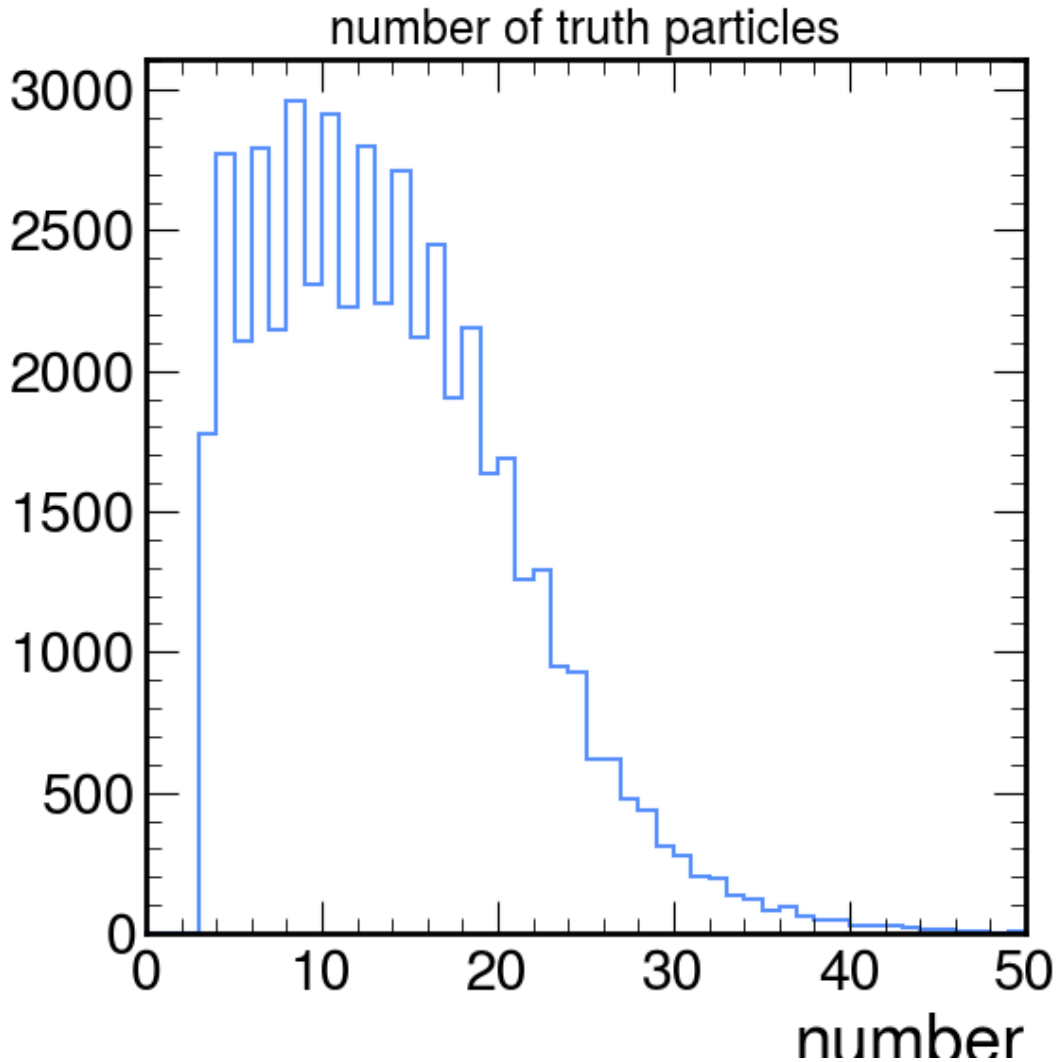
Hit multiplicity (Proton BKG)



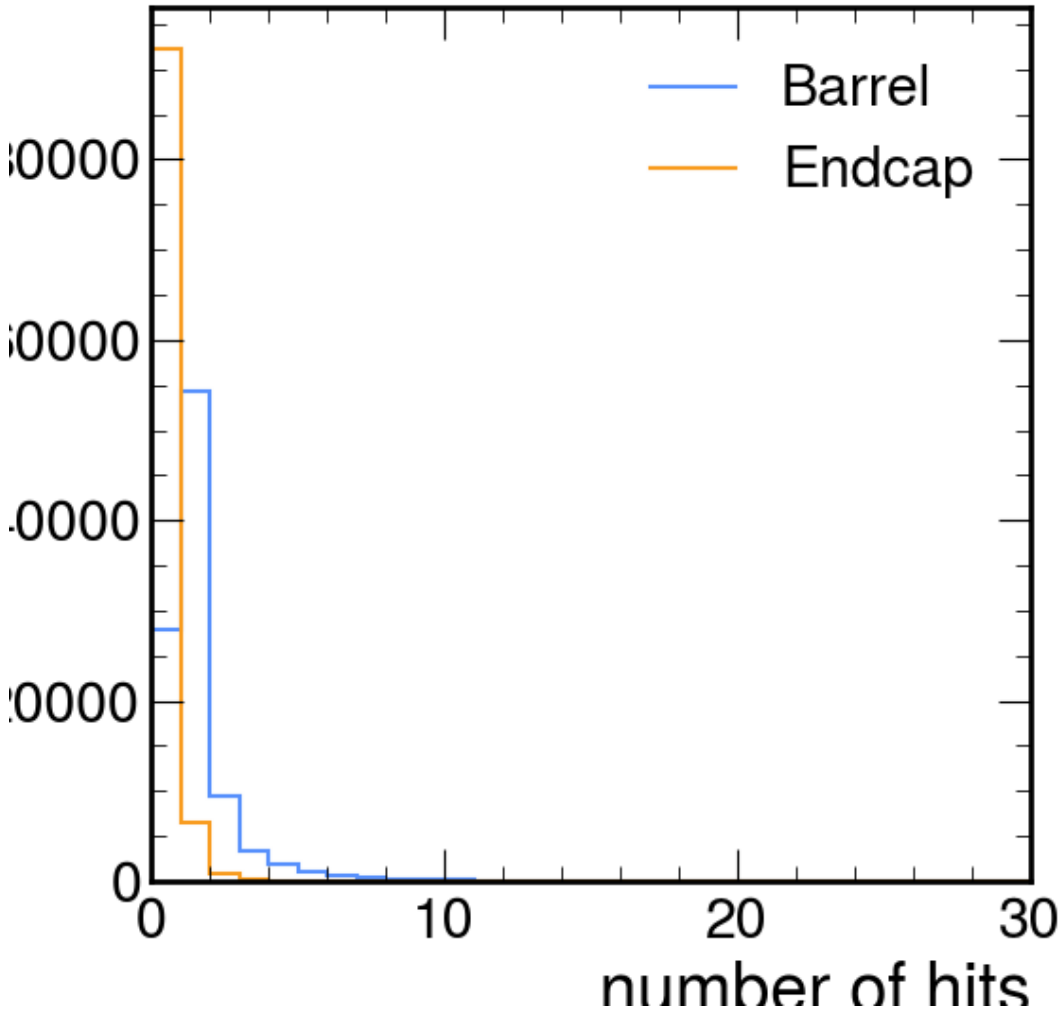


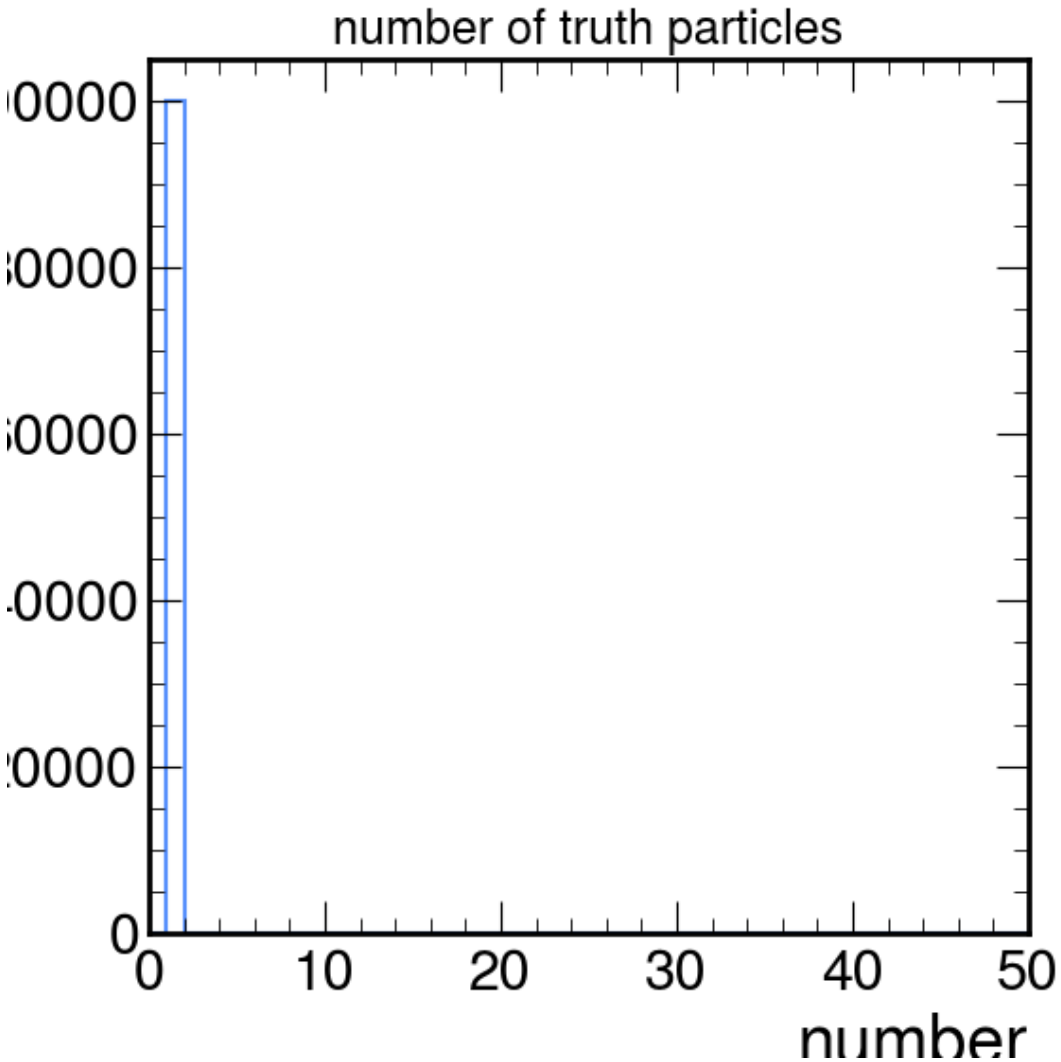
Hit multiplicity (Pythia Own)





Hit multiplicity (single pion)





backup (PID info in Pythia sample)