dedx

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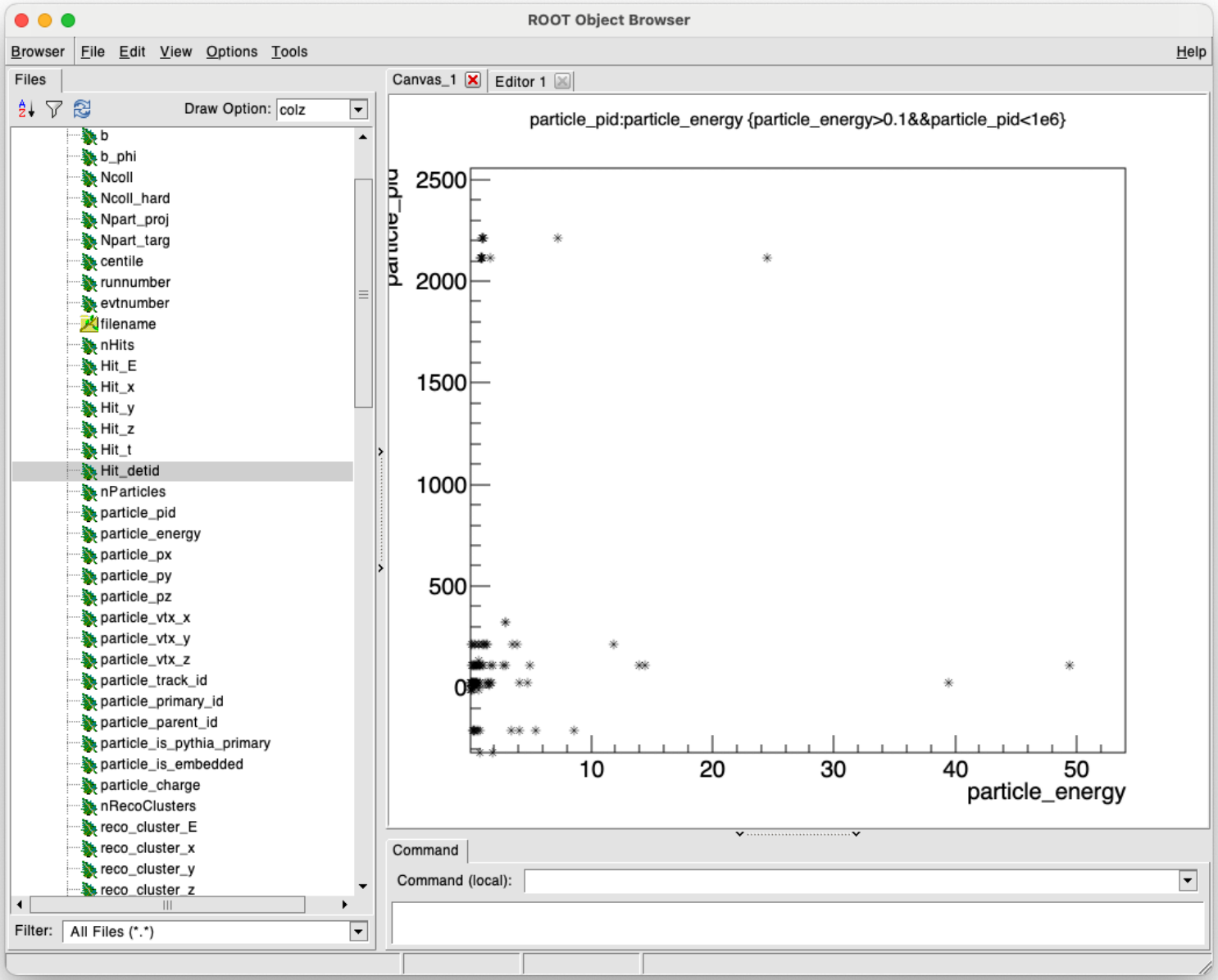
links

https://github.com/sPHENIX-Collaboration/coresoftware/blob/master/offline/packages/trackbase_historic/TrackAnalysisUtils.cc

https://hackmd.io/@HaiwangYu/HJwNbqsKex



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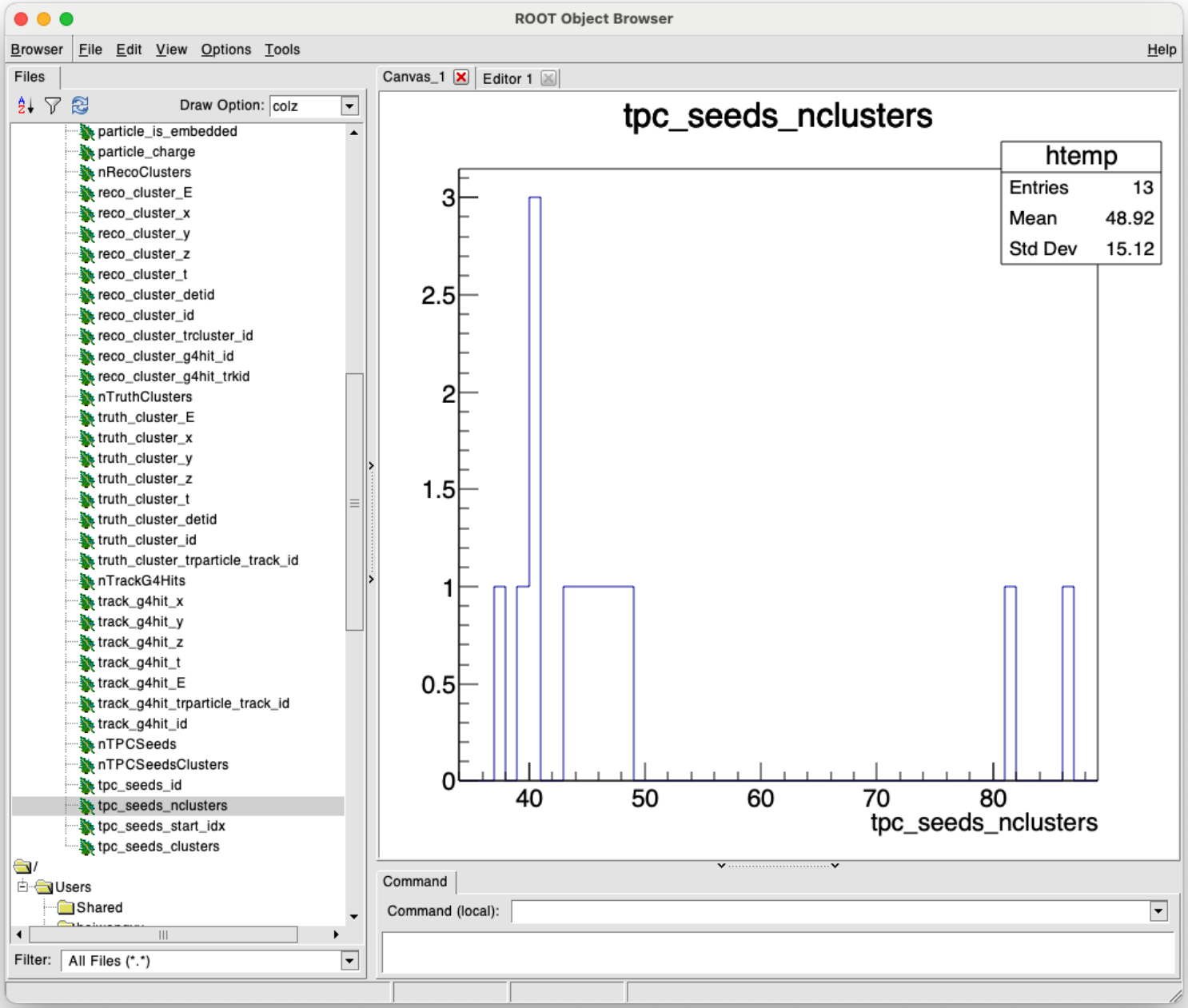
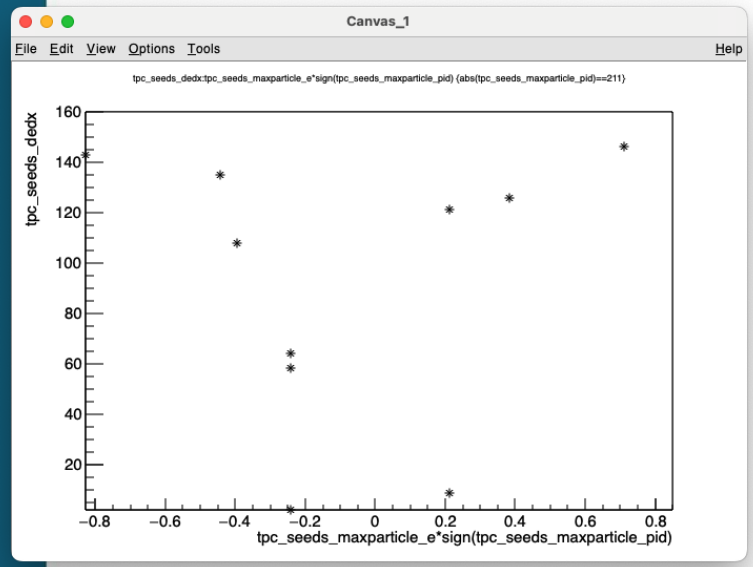
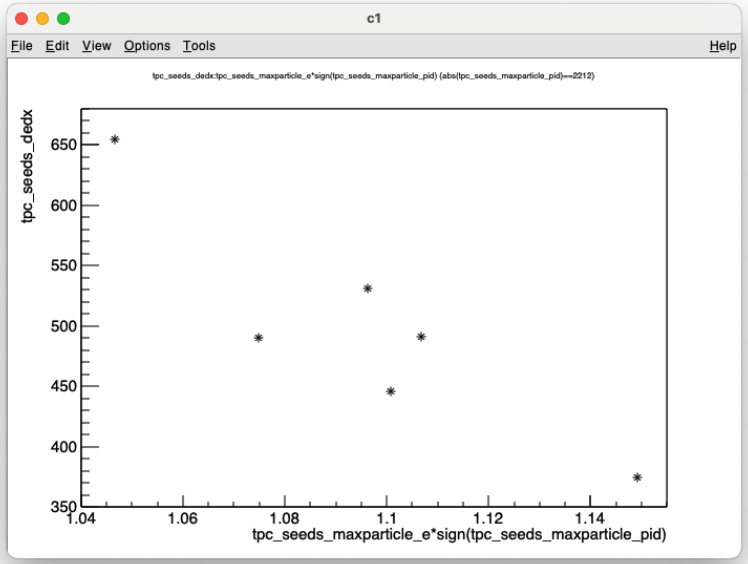
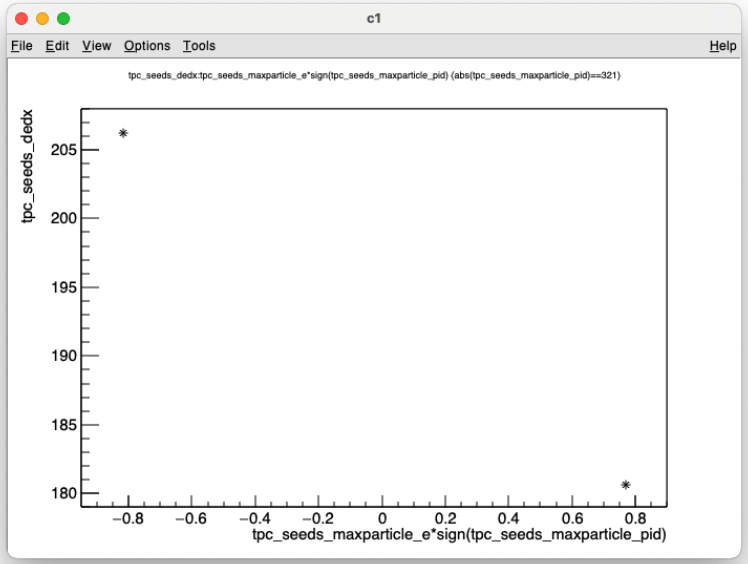

ROOT Object Browser
Browser
File
Edit
View
Options
Tools
Help
Files
Draw Option: colz
particle_is_embedded
particle_charge
nRecoClusters
reco_cluster_E
reco_cluster_x
reco_cluster_y
reco_cluster_z
reco_cluster_t
reco_cluster_detid
reco_cluster_id
reco_cluster_trcluster_id
reco_cluster_g4hit_id
reco_cluster_g4hit_trkid
nTruthClusters
truth_cluster_E
truth_cluster_x
truth_cluster_y
truth_cluster_z
truth_cluster_t
truth_cluster_detid
truth_cluster_id
truth_cluster_trparticle_track_id
nTrackG4Hits
track_g4hit_x
track_g4hit_y
track_g4hit_z
track_g4hit_t
track_g4hit_E
track_g4hit_trparticle_track_id
track_g4hit_id
nTPCSeeds
nTPCSeedsClusters
tpc_seeds_id
tpc_seeds_nclusters
tpc_seeds_start_idx
tpc_seeds_clusters
/
Users
Shared
Filter: All Files (*.*)
Canvas_1
Editor 1
tpc_seeds_nclusters
htemp
Entries 13
Mean 48.92
Std Dev 15.12
0
0.5
1
1.5
2
2.5
3
40
50
60
70
80
tpc_seeds_nclusters
Command
Command (local):

10events, pi, K, p

T->Draw("tpc_seeds_dedx:tpc_seeds_maxparticle_e*sign(tpc_seeds_maxparticle_pid)","abs(tpc_seeds_maxparticle_pid)==321","*")







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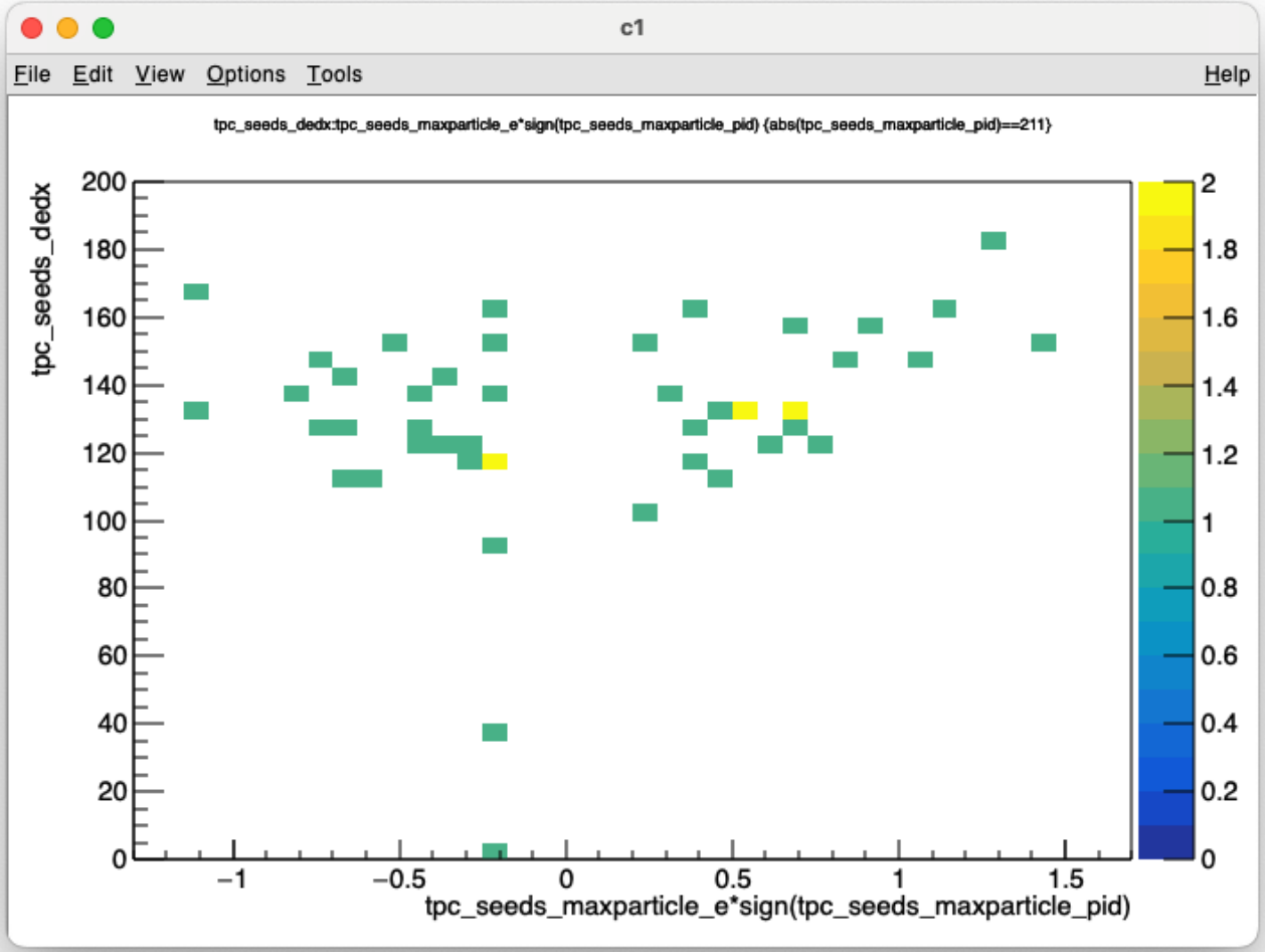

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10 events

```
real    8m3.644s        2.7M Sep 15 23:12 G4sPHENIX_g4svtx_eval.root
user    7m51.438s       1.6M Sep 15 23:12 calotrkana.root
sys     0m7.660s         27K Sep 15 23:12 log
```

500 events

```
real    305m13.437s      91M Sep 16 04:34 G4sPHENIX_g4svtx_eval.root
user    304m19.925s      54M Sep 16 04:34 calotrkana.root
sys     1m2.395s        1.5M Sep 16 04:34 log
```

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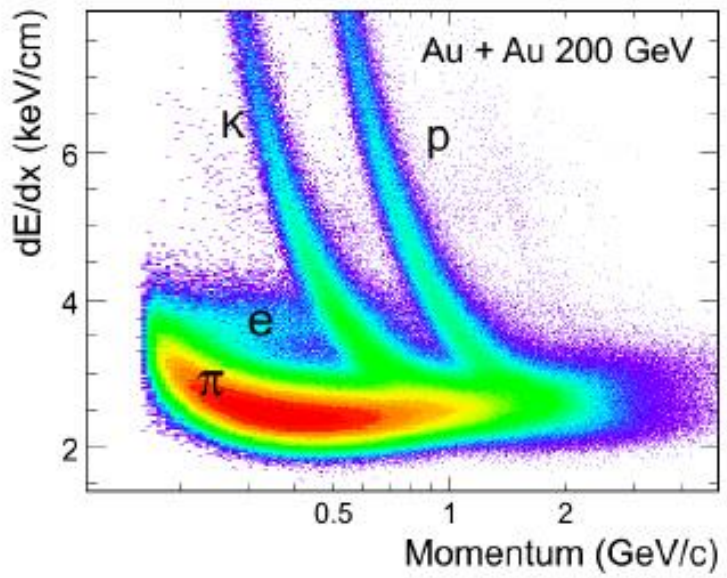
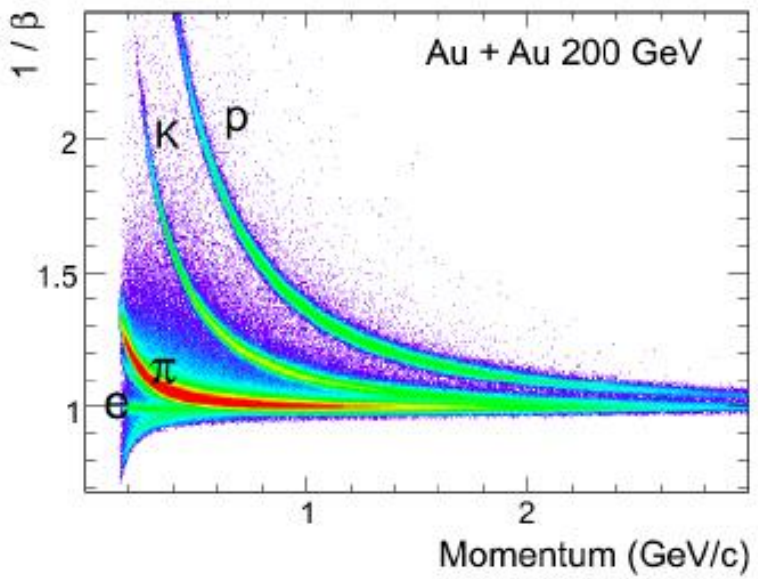
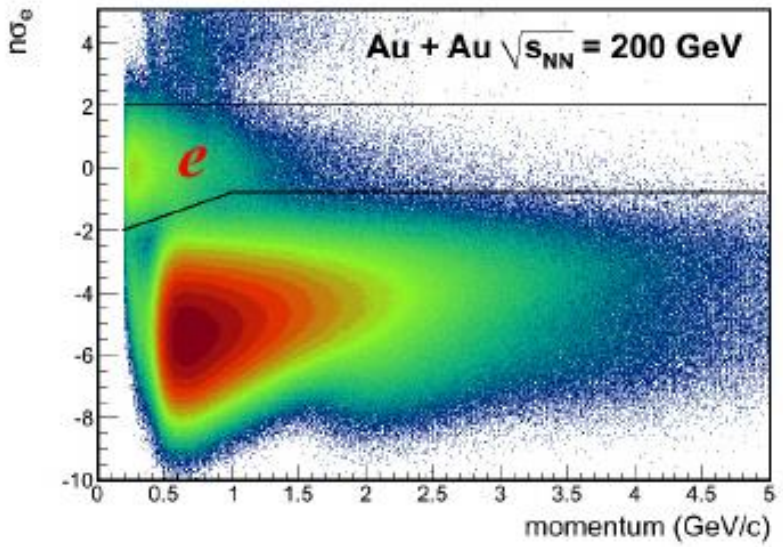
Dielectron Measurements in STAR







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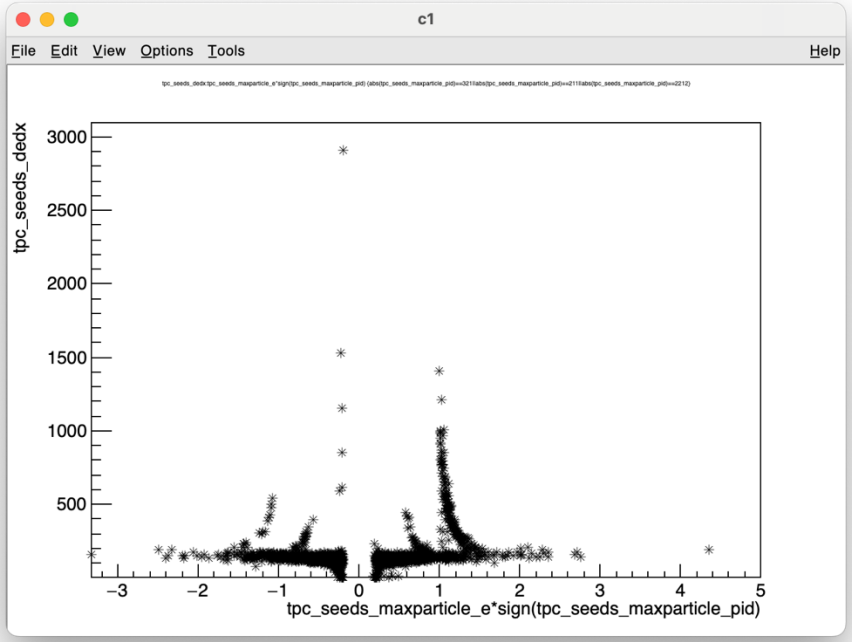
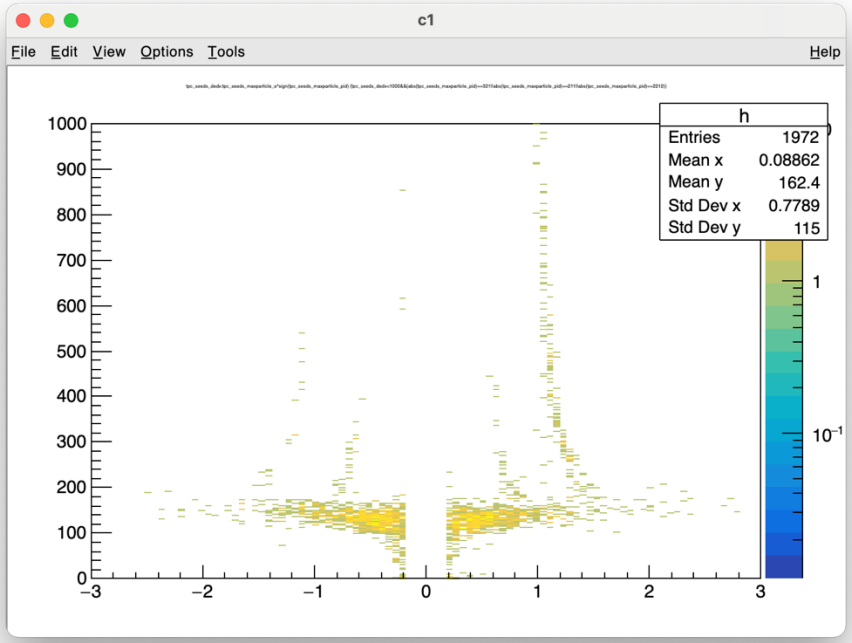
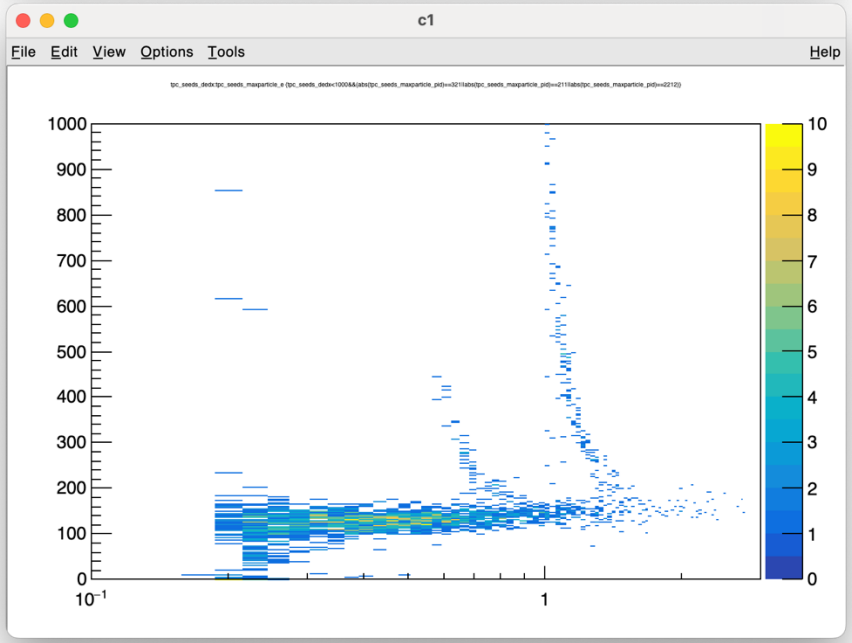
500 events







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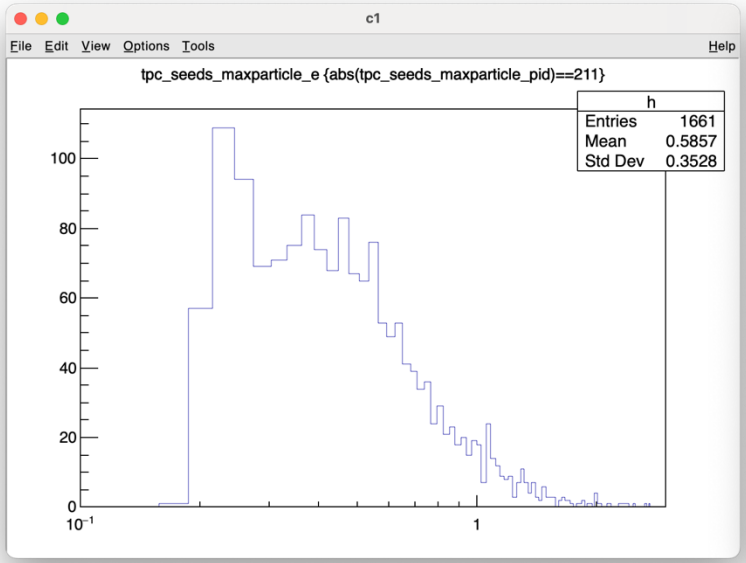

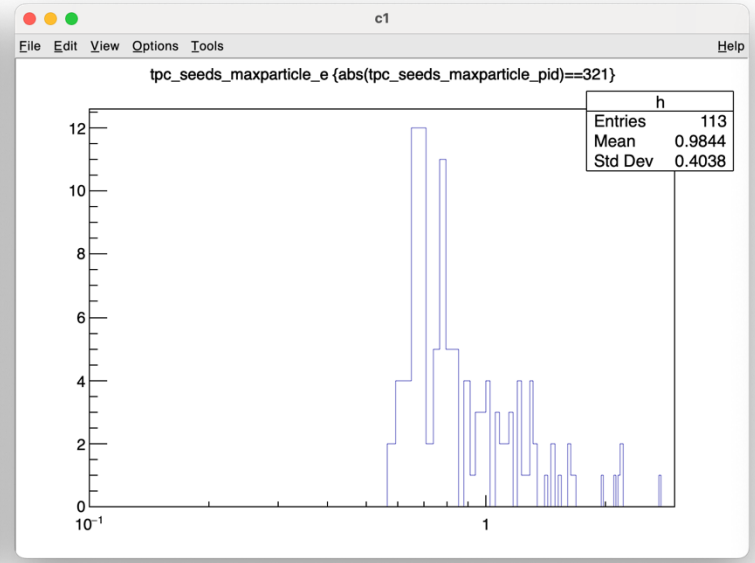

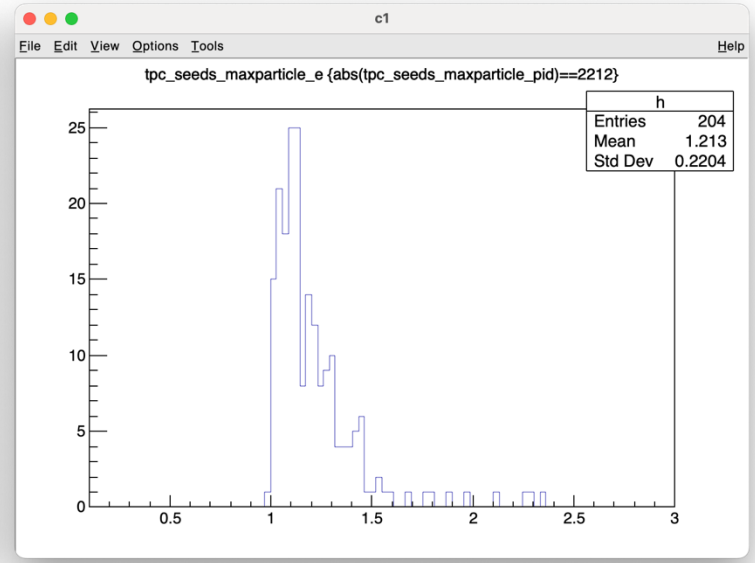

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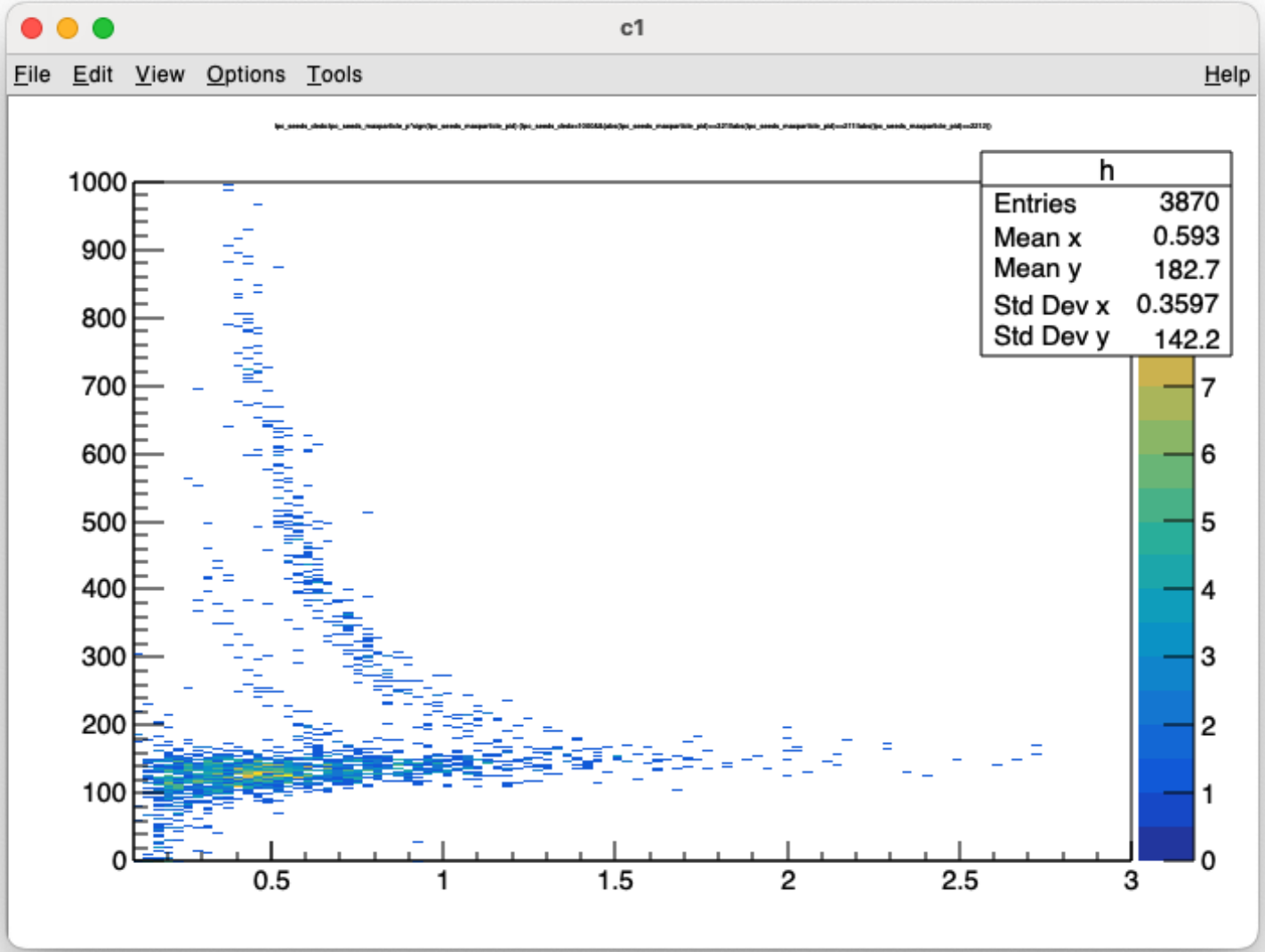
9/19



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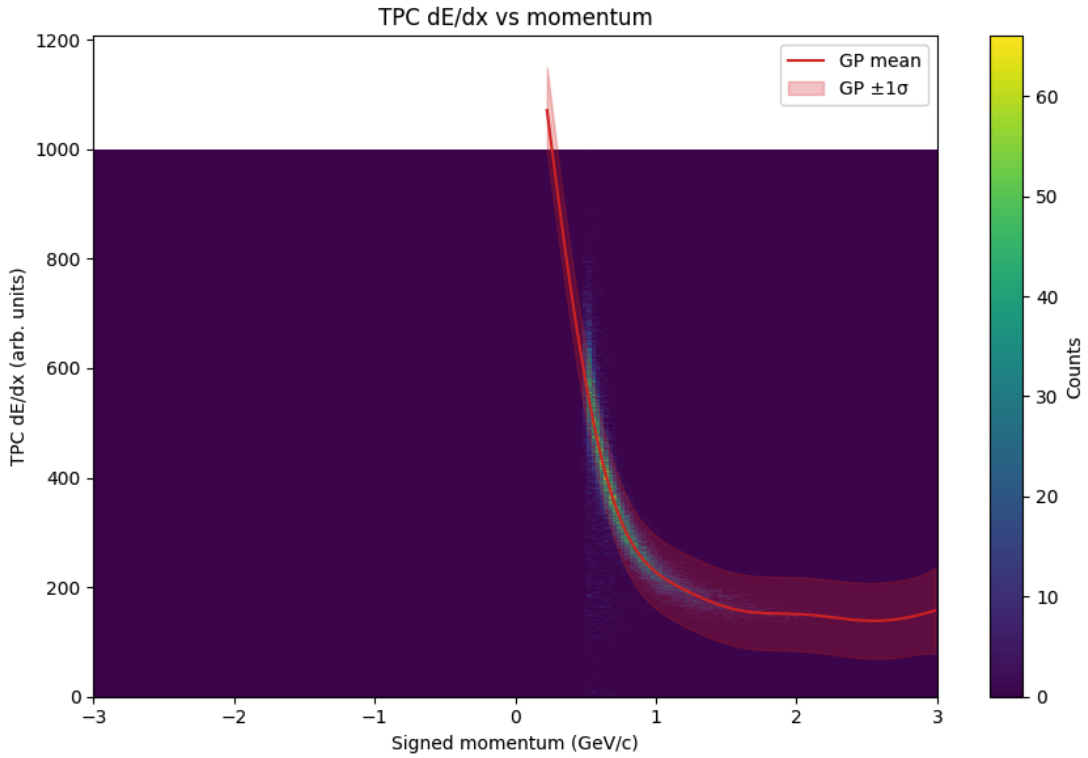
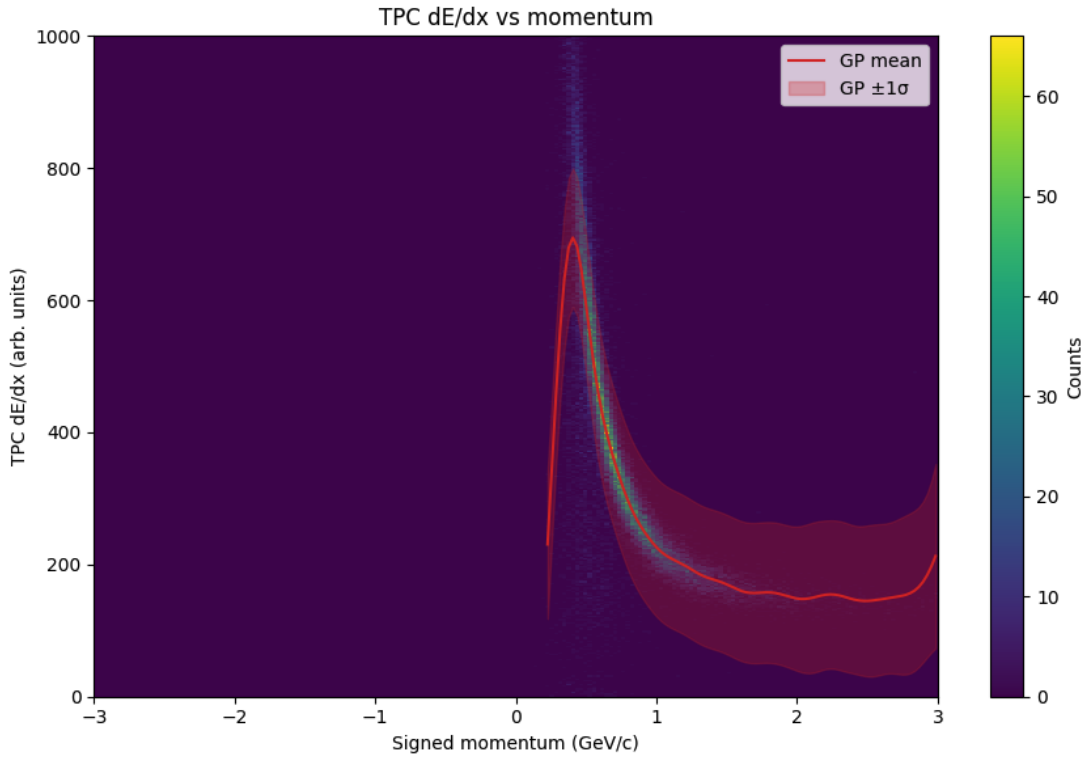
0.5 -> 0.1





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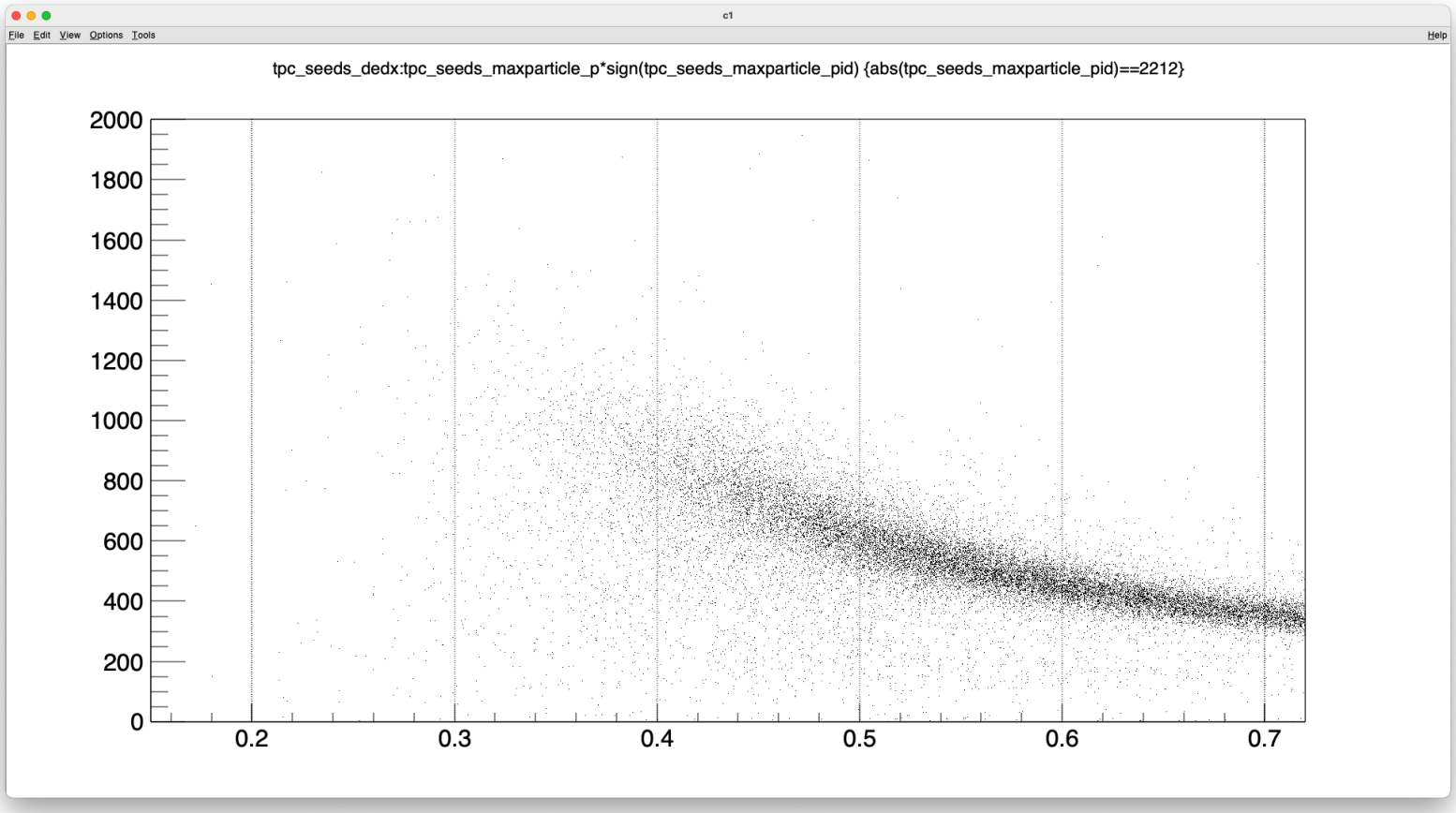
0.4 seems to be a good value



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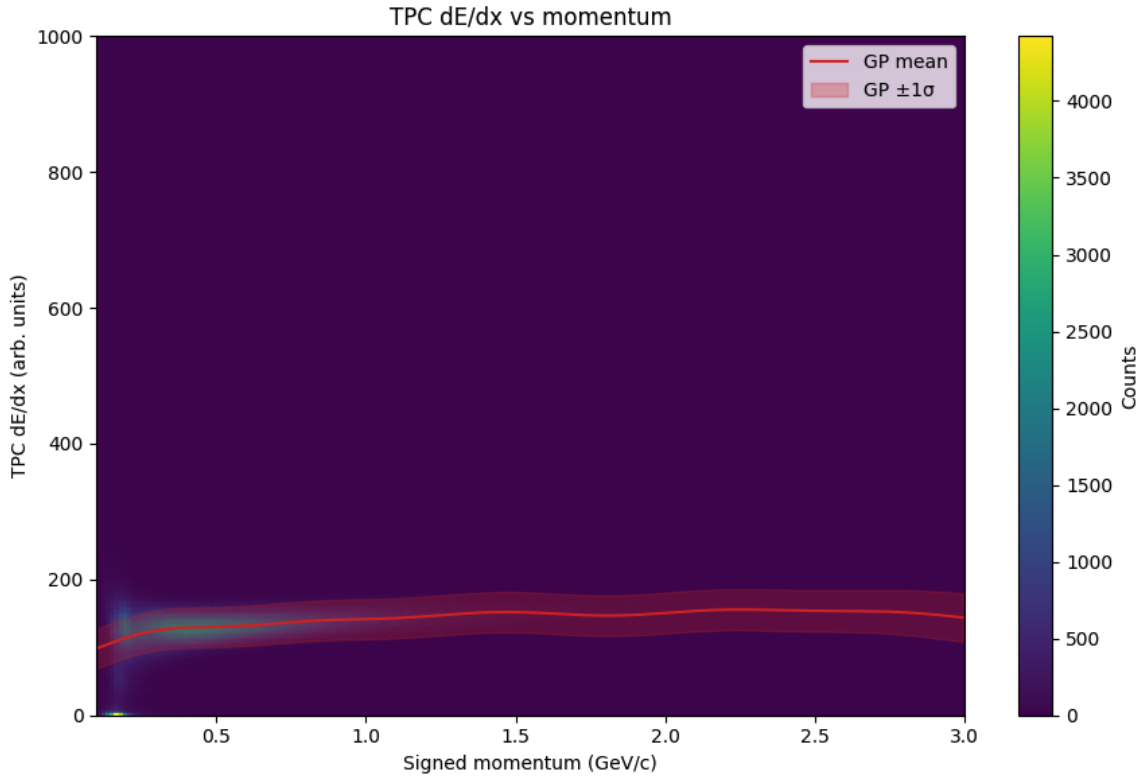
bands-0.1-3.0-1M > dedx_band_211.png



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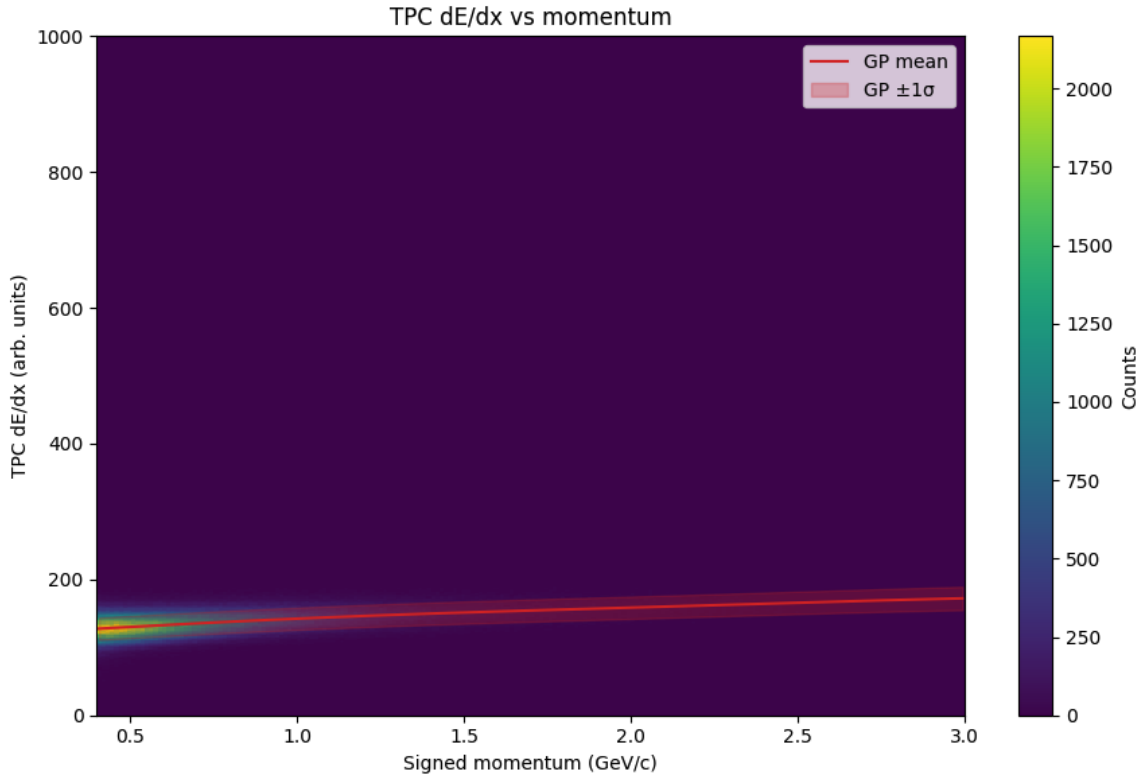

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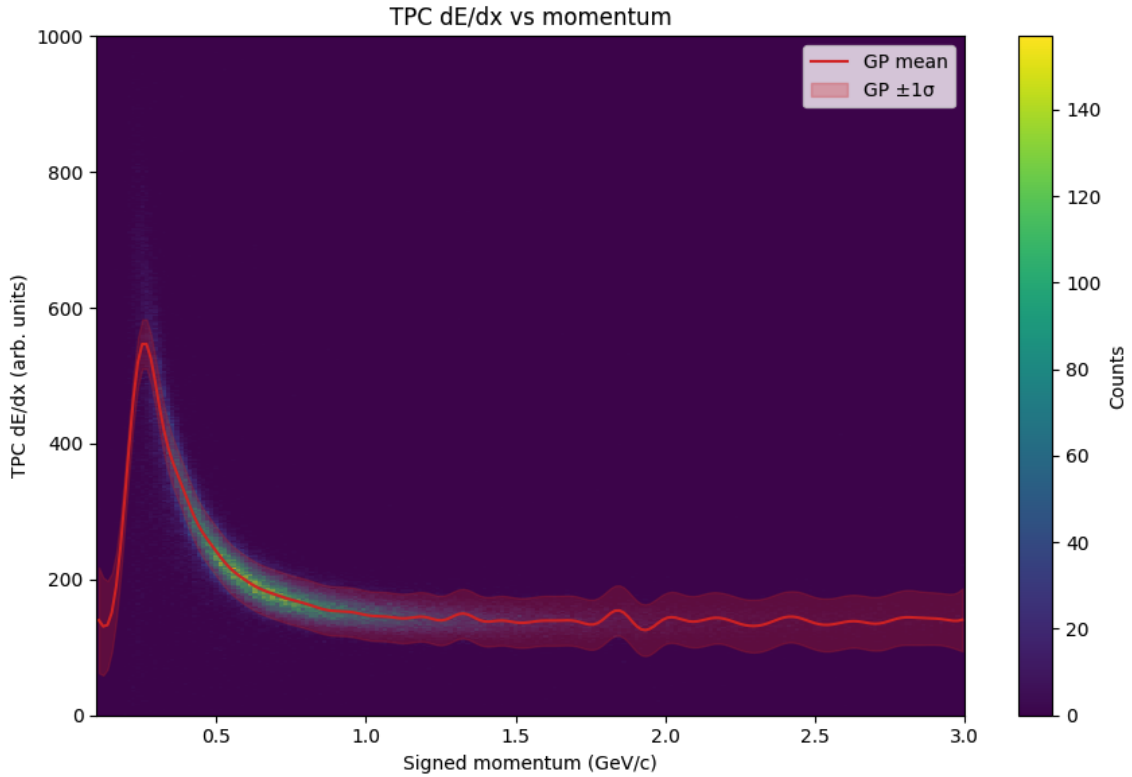
bands-0.1-3.0-1M > dedx_band_321.png



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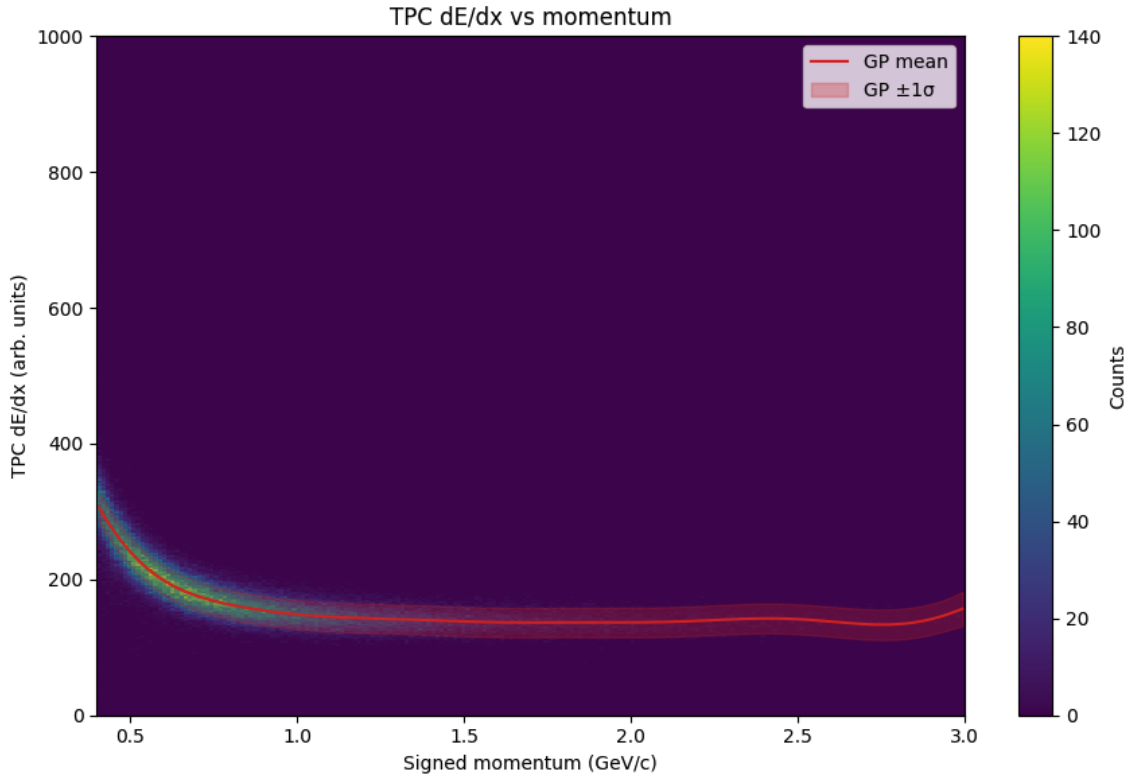

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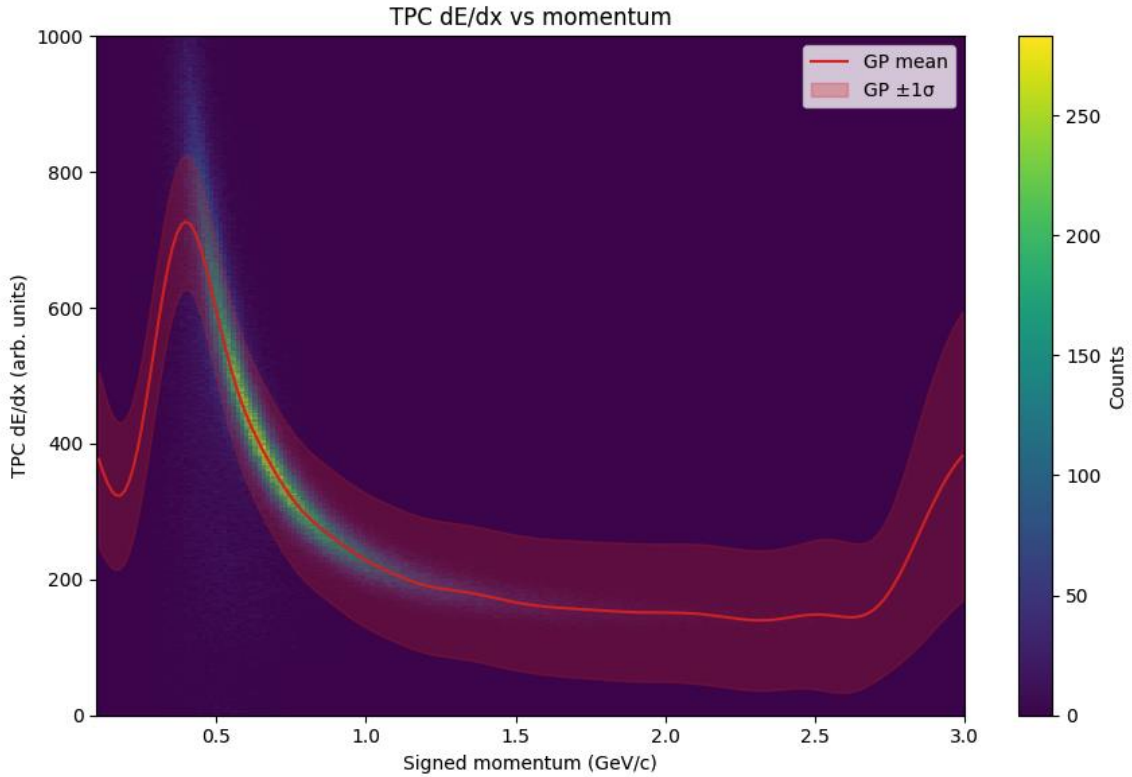
bands-0.1-3.0-1M > dedx_band_2212.png



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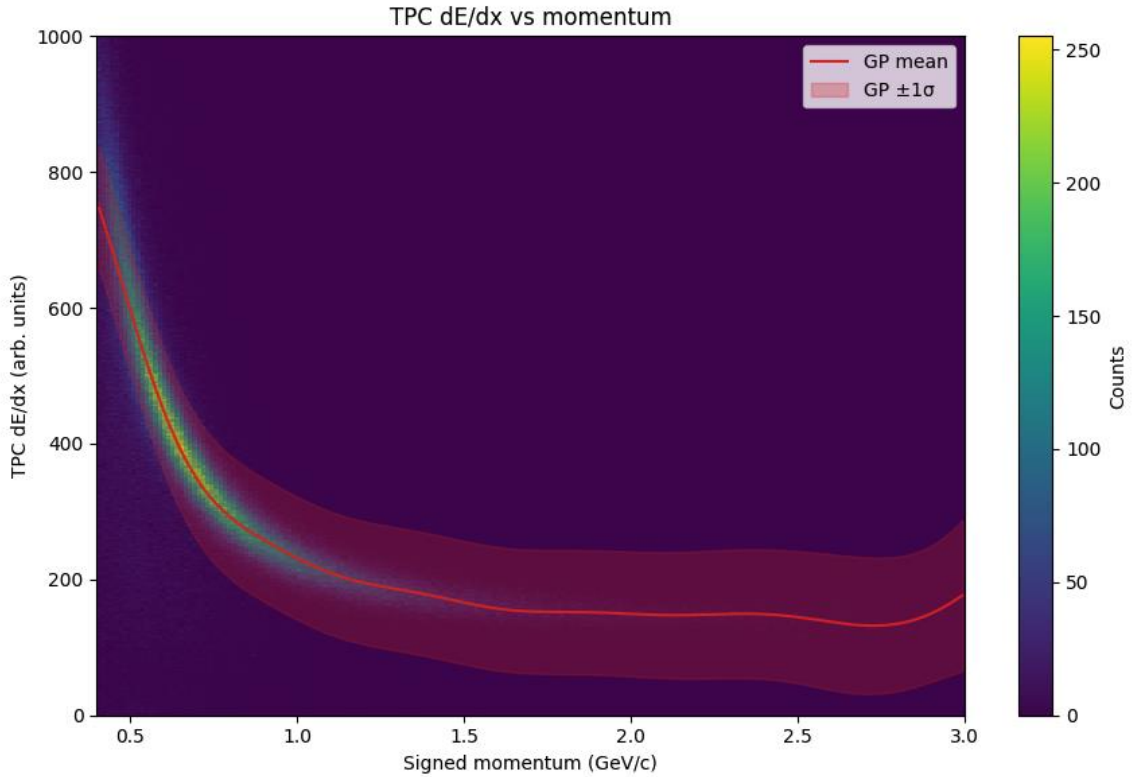

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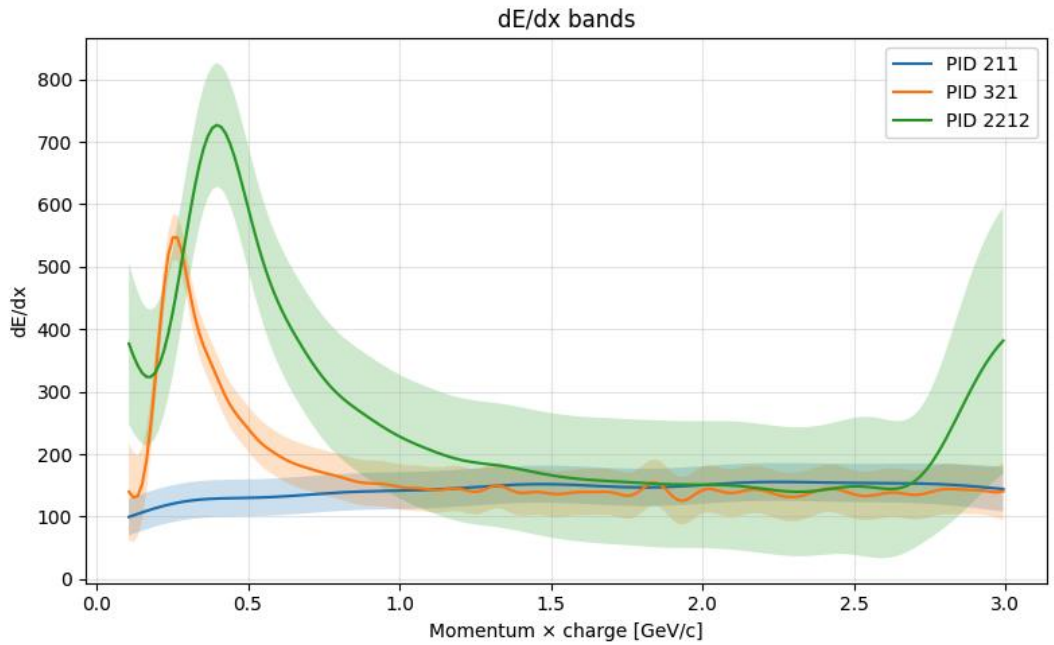
bands-0.1-3.0-1M > dedx_bands_all.png



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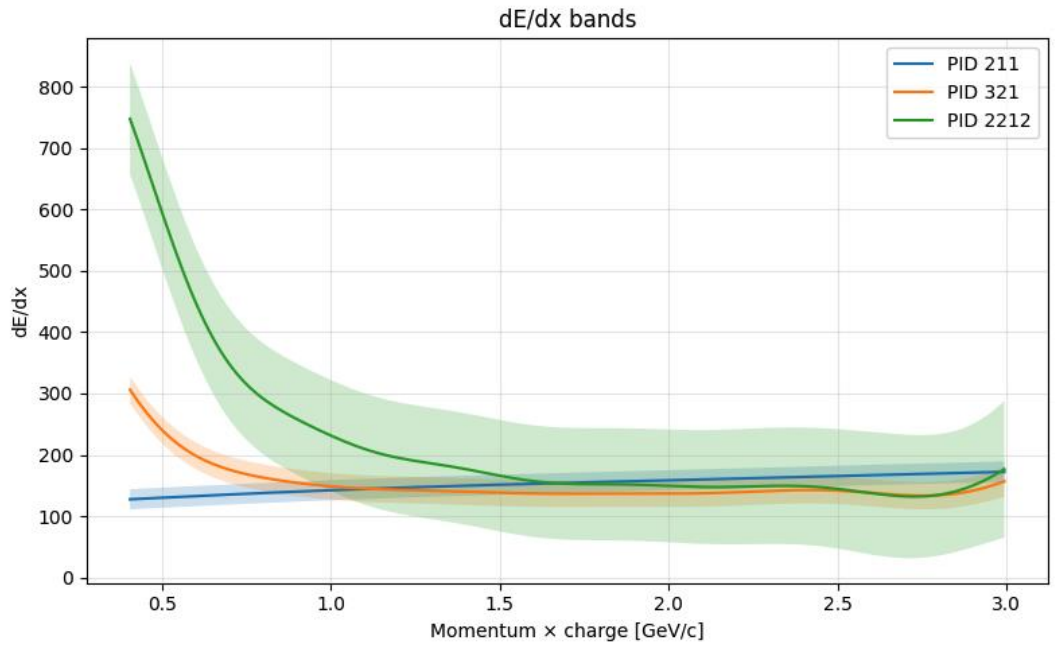

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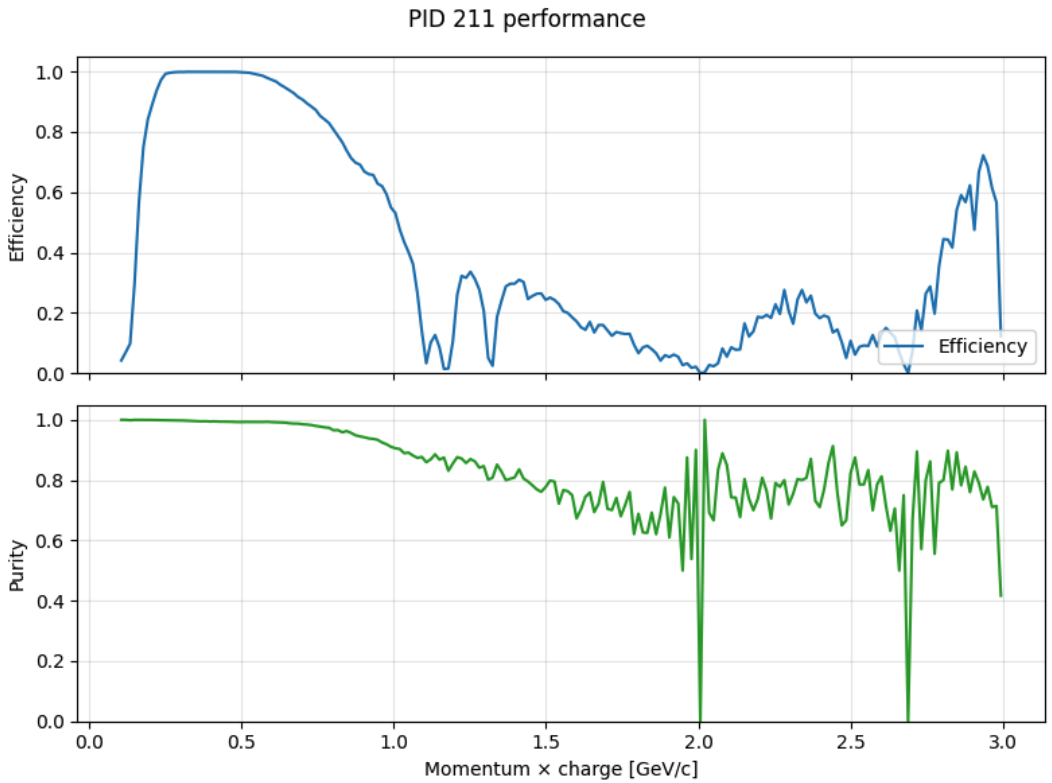
evaluation-0.1-3.0-1M > pid_performance_211_metrics.png



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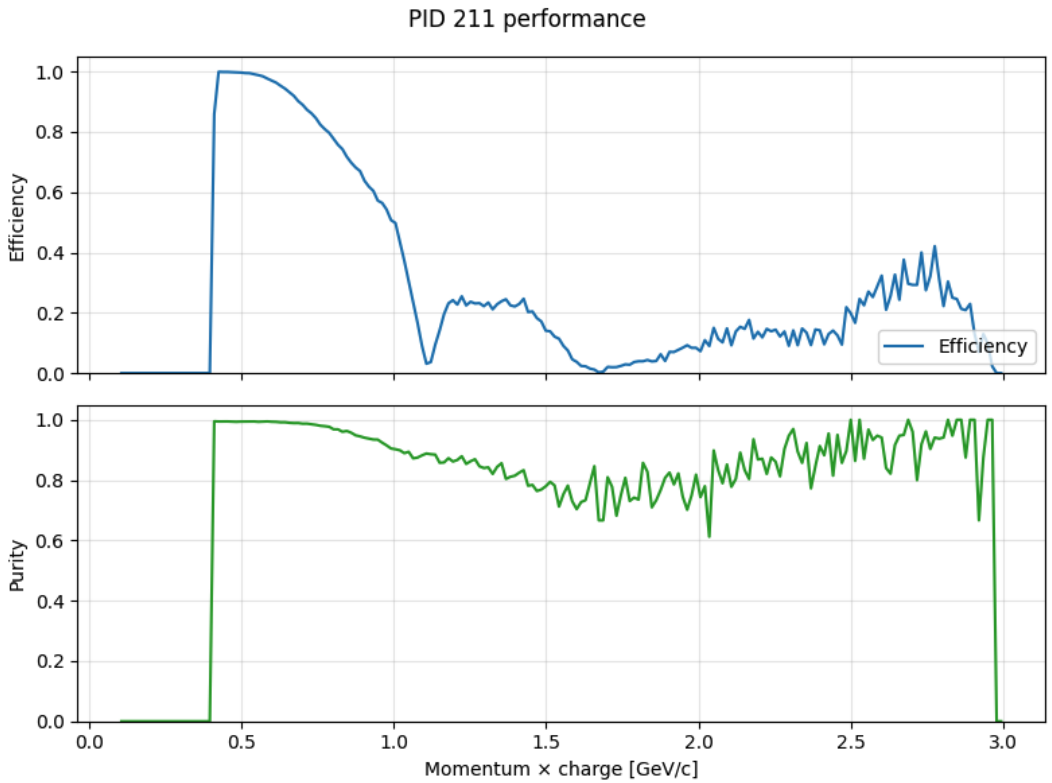

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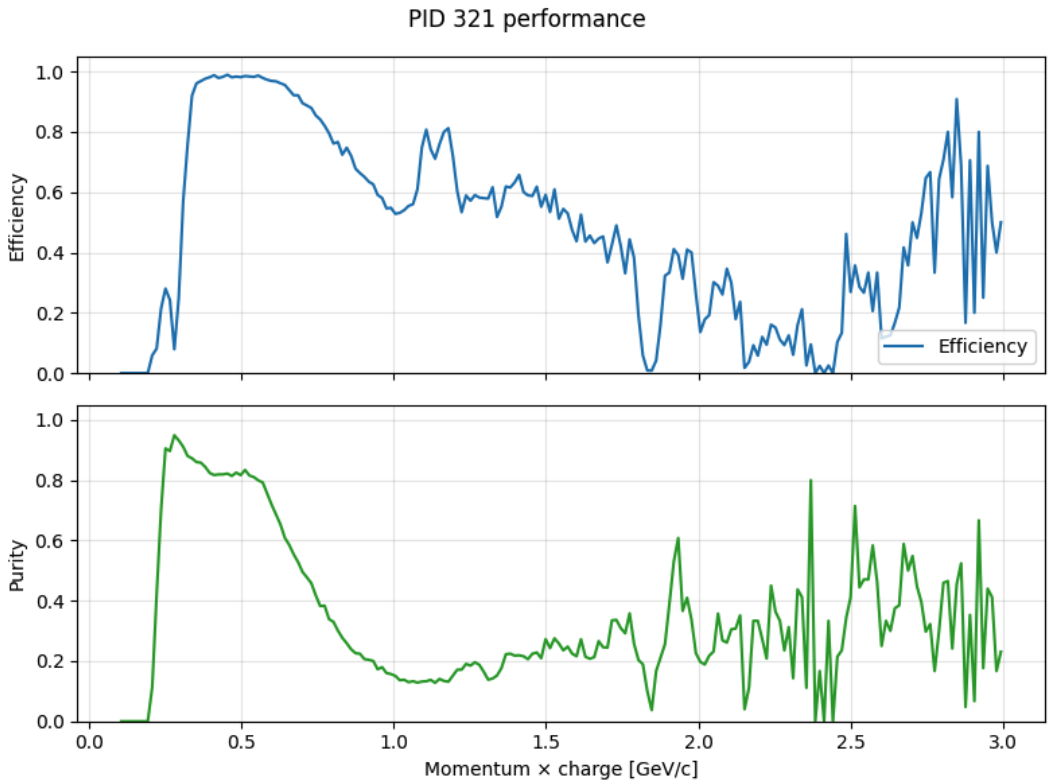

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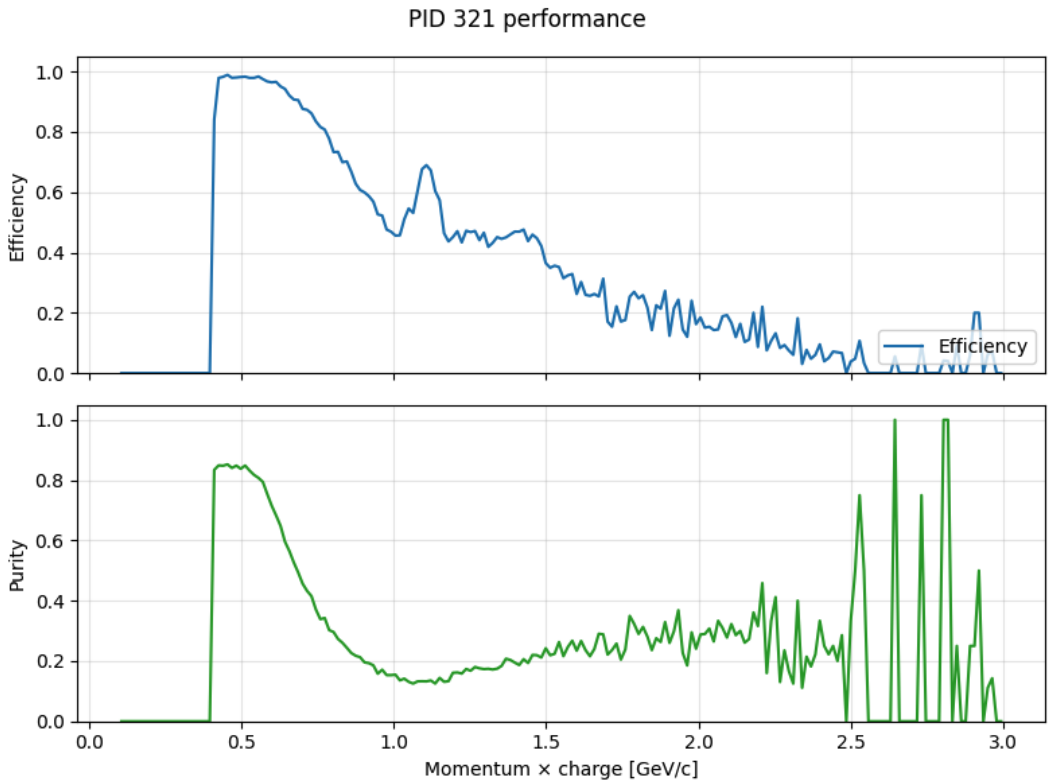

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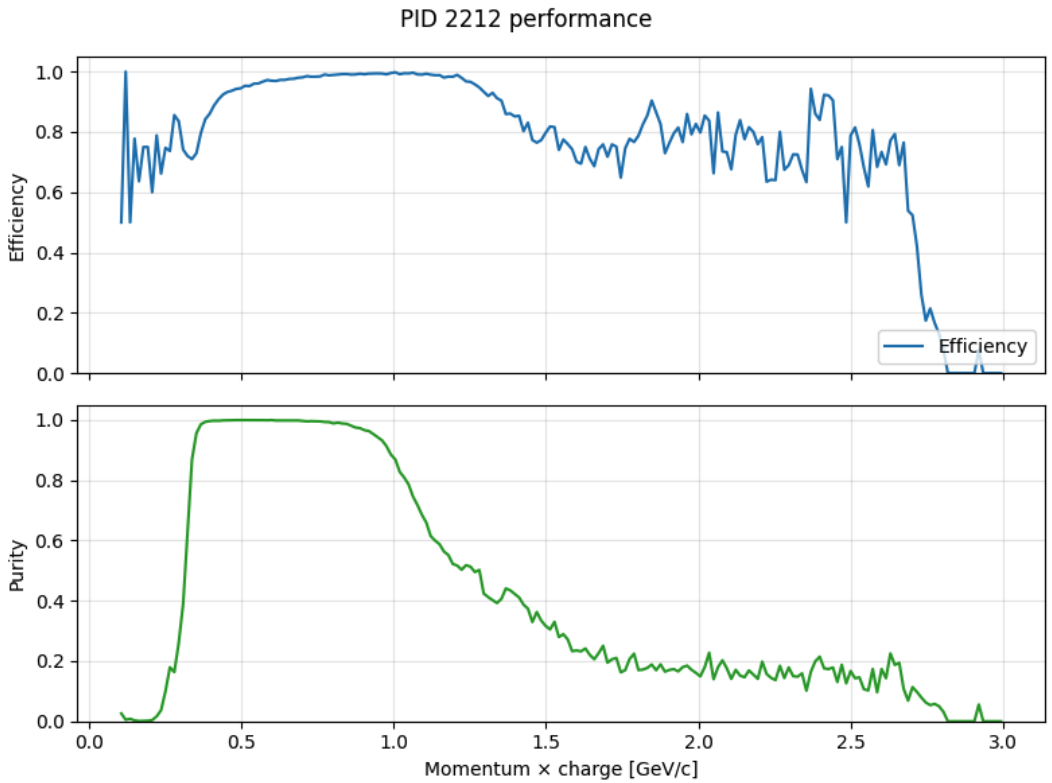

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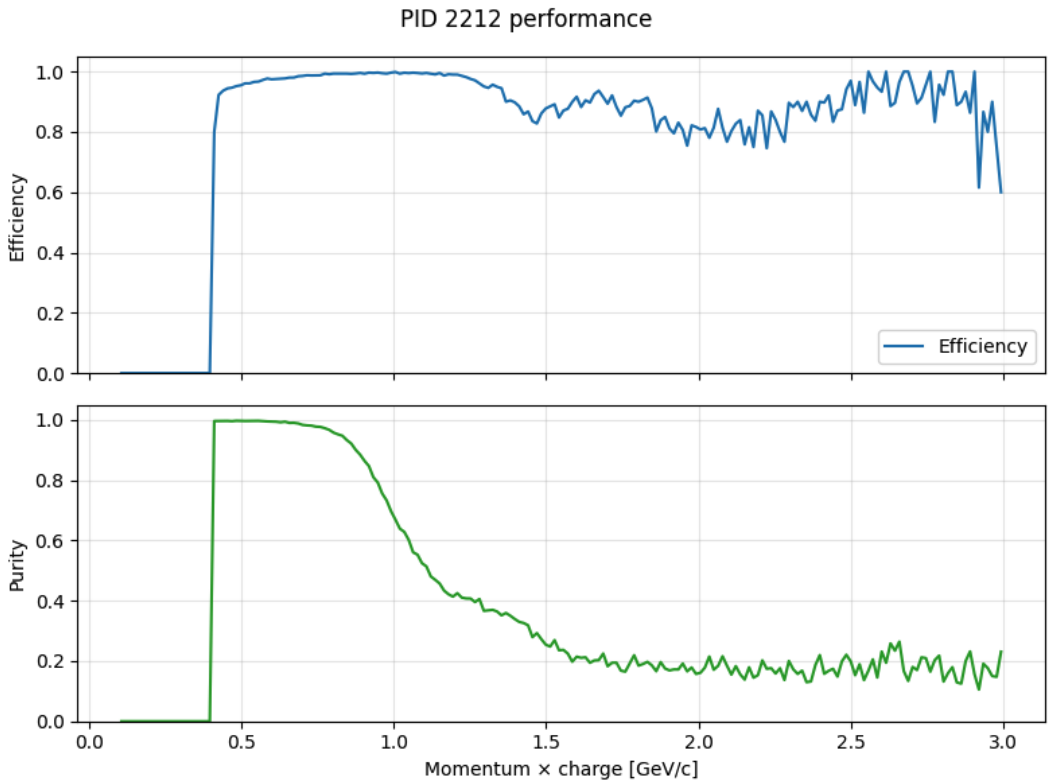

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Summary

- Current result:
  - decent performance < 1GeV as expected
  - For > 1GeV
    - some decent seperation power between 211 and 321 from Sim. alone
    - But due to the large 2212 uncertainty, most PIDs are assigned to 2212

- Current result caveat:
  - GPR model does not fit data well and when use low-p data, the model gets un-stable at hight-p
  - prior probability not considered for now, which could have big impact
  - the data-sim difference is currently unknow, so how the result change in data is unknown

- Todo
  - Modify the GPR model to better capture the rapid ramp-up at low p
  - Incorporate both the prior probability and the dist-based score to obtain a better posterior probability