

ProtoDUNE data for the MasterClass (Update)

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Goal

- Getting some display sample of cosmic run from ProtoDUNE data
- We expect to plot some cosmic tracks that the students will be able to see on the website

Status

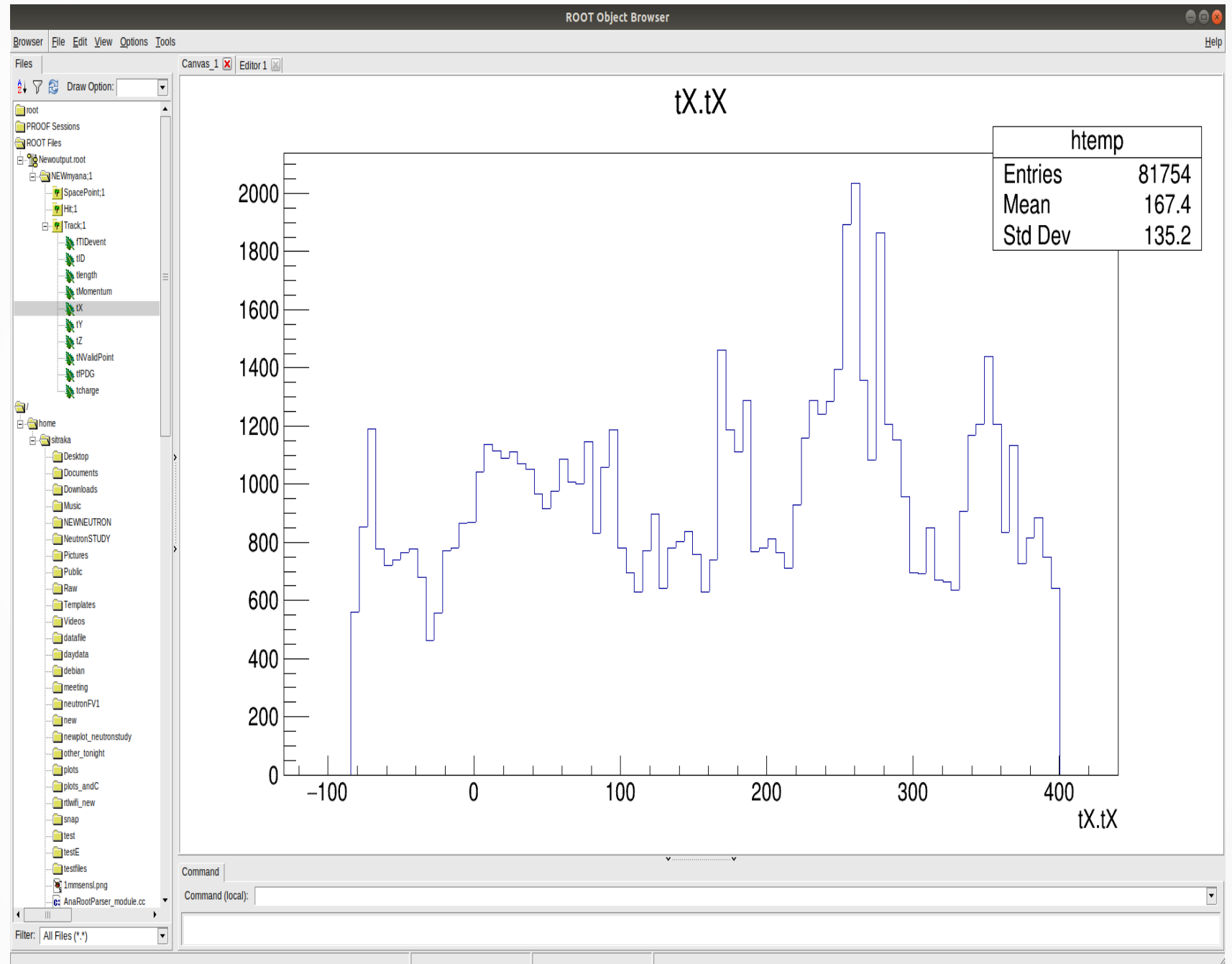
- We found some ProtoDune data with only cosmic run. Those files are raw data.
- We used predefined Larsoft module to get reconstructed Larsoft files.
- After the reconstruction we can see the following information inside the Larsoft file

```
output.txt
RunRawDecoder ssprawdecoder... external..... | std::vector<recob::OpHit>..... | ..275
RunRawDecoder ssprawdecoder... external..... | std::vector<raw::OpDetWaveform>..... | ..275
RunRawDecoder timingrawdecoder daq..... | std::vector<raw::RDTimeStamp>..... | ..1
Reco..... TriggerResults.. | art::TriggerResults..... | ..-
Reco..... pntack..... | std::vector<recob::Vertex>..... | ..44
Reco..... pandoracalo.... | art::Assns<recob::Track,anab::Calorimetry,void>..... | ..273
Reco..... pandora..... | art::Assns<recob::PFParticle,recob::SpacePoint,void>..... | 22830
Reco..... pntackpid..... | art::Assns<recob::Track,anab::ParticleID,void>..... | ..147
Reco..... reco3d..... noreg..... | std::vector<recob::SpacePoint>..... | 15754
Reco..... pandora..... | std::vector<recob::Vertex>..... | ..249
Reco..... pandorashower... | art::Assns<recob::Shower,recob::Hit,void>..... | ..3545
Reco..... pntack..... | art::Assns<recob::PFParticle,recob::Vertex,void>..... | ..88
Reco..... pandoracalo.... | std::vector<anab::Calorimetry>..... | ..273
Reco..... hitpdune..... | art::Assns<recob::Wire,recob::Hit,void>..... | 38605
Reco..... ophitExternal... | std::vector<recob::OpHit>..... | ..336
Reco..... pntack..... kink..... | art::Assns<recob::Track,recob::Vertex,void>..... | ...0
Reco..... pandora..... | art::Assns<recob::PFParticle,recob::Vertex,void>..... | ..249
Reco..... pandora..... | std::vector<larpandoraobj::PFParticleMetadata>..... | ..249
Reco..... pntack..... kink..... | std::vector<recob::Vertex>..... | ...0
Reco..... linecluster.... | art::Assns<recob::Wire,recob::Hit,void>..... | 37985
Reco..... pntack..... | std::vector<anab::CosmicTag>..... | ...22
Reco..... pandorashower... | std::vector<recob::Shower>..... | ..158
Reco..... linecluster.... | std::vector<recob::Hit>..... | 37985
Reco..... caldata..... | art::Assns<raw::RawDigit,recob::Wire,void>..... | ..6207
Reco..... linecluster.... | std::vector<recob::Vertex>..... | ...1
Reco..... pntack..... | std::vector<recob::PFParticle>..... | ...88
Reco..... pandora..... | std::vector<anab::T0>..... | ...0
Reco..... pandora..... | std::vector<recob::Cluster>..... | ..508
Reco..... pandorashower... | art::Assns<recob::PFParticle,recob::PCAxis,void>..... | ..158
Reco..... pntack..... | std::vector<anab::T0>..... | ...0
Reco..... pandora..... | std::vector<recob::PFParticle>..... | ..249
Reco..... pandoraTrack... | art::Assns<recob::PFParticle,recob::Track,void>..... | ..91
Reco..... gaushit..... | art::Assns<raw::RawDigit,recob::Hit,void>..... | 38605
Reco..... pntack..... | art::Assns<recob::Track,anab::T0,void>..... | ...0
Reco..... reco3d..... | art::Assns<recob::SpacePoint,recob::Hit,void>..... | 39890
Reco..... pandorapid.... | std::vector<anab::ParticleID>..... | ..273
Reco..... pntack..... node..... | std::vector<recob::Vertex>..... | ...0
Reco..... linecluster.... | art::Assns<raw::RawDigit,recob::Hit,void>..... | 37985
Reco..... opflashInternal. | std::vector<recob::OpFlash>..... | ..105
Reco..... linecluster.... | art::Assns<recob::Cluster,recob::Hit,void>..... | 23759
Reco..... opflashInternal. | art::Assns<recob::OpFlash,recob::OpHit,void>..... | ..697
Reco..... pandora..... | art::Assns<recob::Cluster,recob::Hit,void>..... | 26408
Reco..... pntack..... | art::Assns<recob::Track,recob::Hit,recob::TrackHitMeta>..... | 14703
Reco..... hitpdune..... | art::Assns<recob::Hit,recob::SpacePoint,void>..... | 39890
Reco..... pntack..... | art::Assns<recob::Track,recob::Hit,void>..... | 14703
Reco..... pandorapid.... | art::Assns<recob::Track,anab::ParticleID,void>..... | ..273
Reco..... pntack..... | art::Assns<recob::Track,anab::CosmicTag,void>..... | ..22
Reco..... opflashExternal. | std::vector<recob::OpFlash>..... | ...2
Reco..... opflashExternal. | art::Assns<recob::OpFlash,recob::OpHit,void>..... | ..244
Reco..... linecluster.... | std::vector<recob::EndPoint2D>..... | ...58
Reco..... pandorashower... | art::Assns<recob::PFParticle,recob::Shower,void>..... | ..158
Reco..... gaushit..... | std::vector<recob::Hit>..... | 38605
Reco..... pandora..... | art::Assns<recob::PFParticle,larpandoraobj::PFParticleMetadata,void>..... | ..249
Reco..... pntackcalo.... | art::Assns<recob::Track,anab::Calorimetry,void>..... | ..147
```

https://twiki.cern.ch/twiki/pub/CENF/DUNEProtSPPhotonDetectors/lhw_CERNLArSoft.pdf

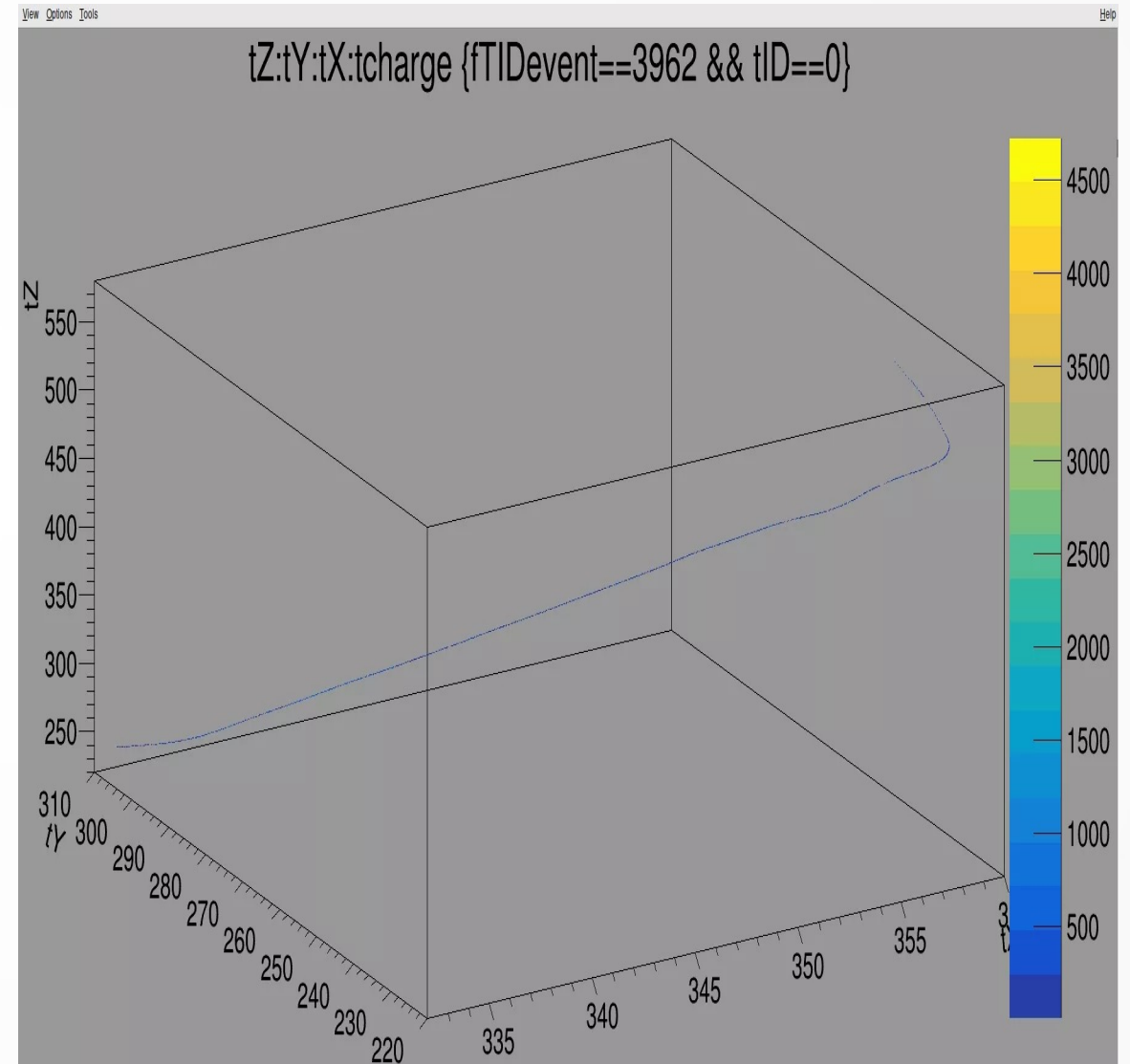
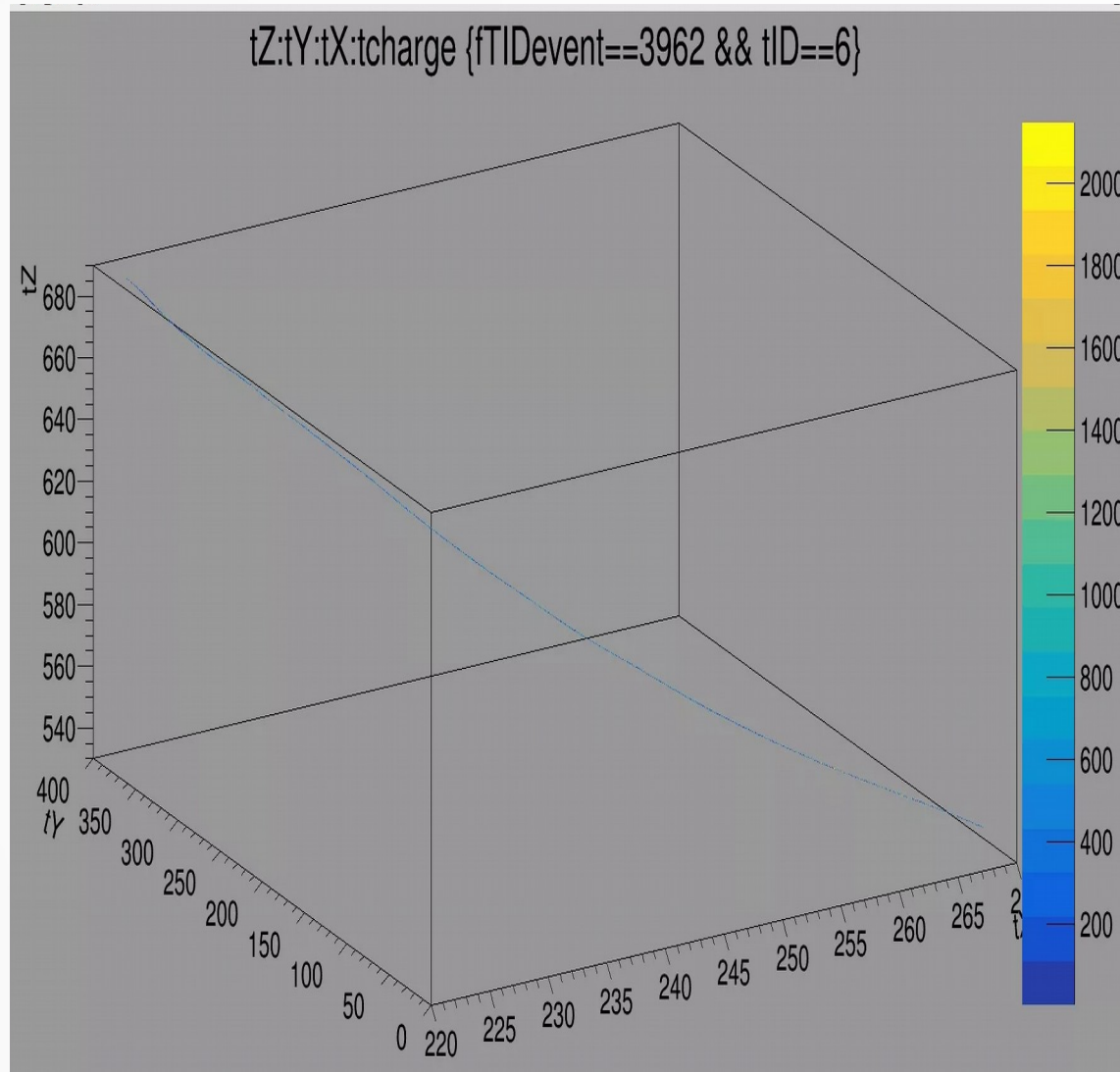
Status

- And we changed the Larsoft format files to root format.
- We took the Track information from the reconstructed Larsoft to create the root file.



Status

- Here are some tracks we got (the color scale is charge)



File with informations

- We created a file with the following information:
- Event ID
- Then tracj

```
information.txt
Open Save
event ID 3962
track ID 0
Position of each point of the track
Point no 0 TX 332.87 TY 308.746 TZ 237.982 charge 415.14
Point no 1 TX 332.889 TY 308.663 TZ 238.135 charge 260.498
Point no 2 TX 332.907 TY 308.571 TZ 238.266 charge 140.989
Point no 3 TX 332.935 TY 308.428 TZ 238.47 charge 20.5203
Point no 4 TX 332.952 TY 308.332 TZ 238.6 charge 13.6579
Point no 5 TX 332.974 TY 308.239 TZ 238.744 charge 10.8561
Point no 6 TX 332.989 TY 308.174 TZ 238.843 charge 33.0269
Point no 7 TX 333.008 TY 308.113 TZ 238.929 charge 40.1665
Point no 8 TX 333.026 TY 308.025 TZ 239.072 charge 48.9571
Point no 9 TX 333.068 TY 307.819 TZ 239.404 charge 30.2641
Point no 10 TX 333.079 TY 307.768 TZ 239.488 charge 32.5974
Point no 11 TX 333.101 TY 307.655 TZ 239.676 charge 36.7031
Point no 12 TX 333.122 TY 307.545 TZ 239.854 charge 39.3171
Point no 13 TX 333.122 TY 307.544 TZ 239.856 charge 41.8171
Point no 14 TX 333.143 TY 307.454 TZ 240.009 charge 26.0513
Point no 15 TX 333.145 TY 307.446 TZ 240.024 charge 15.7269
Point no 16 TX 333.171 TY 307.334 TZ 240.214 charge 150.923
Point no 17 TX 333.188 TY 307.258 TZ 240.346 charge 335.184
Point no 18 TX 333.195 TY 307.226 TZ 240.401 charge 557.121
Point no 19 TX 333.206 TY 307.176 TZ 240.487 charge 1723.74
Point no 20 TX 333.26 TY 306.929 TZ 240.914 charge 21.1214
Point no 21 TX 333.263 TY 306.916 TZ 240.936 charge 31.2454
Point no 22 TX 333.263 TY 306.915 TZ 240.938 charge 17.3329
Point no 23 TX 333.268 TY 306.894 TZ 240.974 charge 31.7262
Point no 24 TX 333.273 TY 306.869 TZ 241.017 charge 92.6637
Point no 25 TX 333.281 TY 306.829 TZ 241.087 charge 28.3715
Point no 26 TX 333.305 TY 306.717 TZ 241.281 charge 21.9245
Point no 27 TX 333.343 TY 306.544 TZ 241.581 charge 48.5208
Point no 28 TX 333.346 TY 306.528 TZ 241.608 charge 149.663
Point no 29 TX 333.363 TY 306.444 TZ 241.754 charge 37.8045
Point no 30 TX 333.387 TY 306.331 TZ 241.951 charge 210.784
Point no 31 TX 333.389 TY 306.323 TZ 241.965 charge 31.4397
Point no 32 TX 333.395 TY 306.293 TZ 242.016 charge 150.494
Point no 33 TX 333.401 TY 306.266 TZ 242.063 charge 109.451
Point no 34 TX 333.433 TY 306.109 TZ 242.336 charge 220.468
Point no 35 TX 333.475 TY 305.9 TZ 242.698 charge 134.078
Plain Text Tab Width: 8 Ln 21, Col 46 INS
```

Next steps

- We want to get more data.