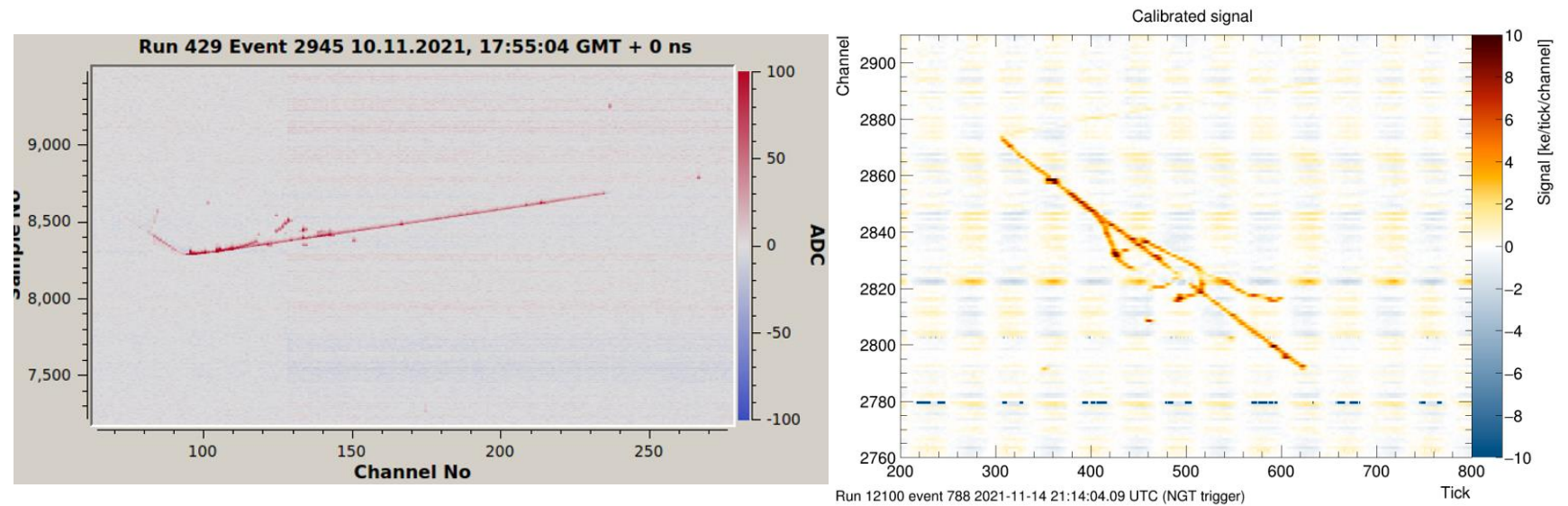


## Update on Cold-box raw data reconstruction



# Organization of Cold-box raw data reconstruction

- A campaign to reconstruct vertical drift Cold-box raw data has been organized within the DUNE production group, and raw data processing started this week
  - dunesw version v09\_44\_00\_02
  - vdcoldbox\_raw\_tdedataprep\_reco.fcl
- Processing steps: data preparation, signal processing, hits reconstruction, tracks reconstruction with Pandora. The setting up and validation of each of these steps are the result of the work of several people since November (see presentations given at the Cold-box analysis meetings and Far Detector sim-reco meetings).
- Before moving to the systematic reconstructions of all data collected in November /December 2021, a pre-production test has been organized. The **short term goal** of this pre-production is to check the stability of the code and the physical results. Two possibilities:
  - 1) everything is fine → all raw data are reconstructed with the same software version
  - 2) improvements are needed → once a new code version is finalized, a new production test is organized (same data samples)
- On a **longer time scale**, the goal is to put in place a keep-up production of Cold-box data for the next data taking campaigns foreseen in 2022, so that raw data can be reconstructed as soon as they become available

# Pre-production: data sample description and reconstruction results availability

- 2 data sample have been selected, run 419 and run 455 (TDE) → ~95k events in 900 data files
- run 419 processing already finished (jobs run smoothly), data management team is taking care on moving output file on tape
- SAM definition of the production output: **vd\_coldbox\_top\_runset\_429\_reco\_v0**

```
pennacc@cca008:~$ samweb get-metadata 429_265_cb_reco_54207693_0_2022-03-10T004213Z.root
File Name: 429_265_cb_reco_54207693_0_2022-03-10T004213Z.root
File Id: 66275161
Create Date: 2022-03-10T02:02:47+00:00
User: dunepro
File Size: 1416806681
Checksum: enstore:2100168118
          adler32:314f05b7
          md5:4d68bb48b1c43d9e0ae87adcb21ae7c8
Content Status: good
File Type: detector
File Format: artroot
Data Tier: full-reconstructed
Application: art reco v09_44_00_02
Process Id: 19198699
Event Count: 110
First Event: 29045
Last Event: 29154
Start Time: 2022-03-10T01:37:56+00:00
End Time: 2022-03-10T02:02:35+00:00
Data Stream: test
art.file_format_era: ART_2011a
art.file_format_version: 14.0
art.first_event: 29045.0
art.last_event: 29154.0
art.process_name: VDTDEDataPrepReco
art.run_type: vd-coldbox-top
DUNE.campaign: VD_coldbox_TDE_2021
Runs: 429.0265 (vd-coldbox-top)
Parents: 429_265_cb.test
```

Output file size ~1.5 GB

Metadata of reconstructed files already validated with the data management team.

- run 455 is being processed now; once finished the SAM definition of production output will be **vd\_coldbox\_top\_runset\_455\_reco\_v0**
- Distributions of memory footprint and CPU usage will be prepared on the full data sample (run 419+455)

Size in bytes	Fraction	Data Product Name
1406596037	0.988	raw::RawDigits_tpcrawdecoder_daq_VDTDEDataPrepReco.
5336299	0.004	recob::Wires_wclsdatanfsp_gauss_VDTDEDataPrepReco.
5327453	0.004	recob::Wires_wclsdatanfsp_wiener_VDTDEDataPrepReco.
1680980	0.001	recob::Hits_gaushit__VDTDEDataPrepReco.
866055	0.001	anab::Calorimetrys_pandoracalo_VDTDEDataPrepReco.
676984	0.000	recob::Tracks_pandoraTrack__VDTDEDataPrepReco.
647687	0.000	raw::RawDigitrecob::Wirevoidart::Assns_caldata_dataprep_VDTDEDataPrepReco.
408020	0.000	recob::SpacePoints_pandora__VDTDEDataPrepReco.
188723	0.000	recob::Hitrecob::Wirevoidart::Assns_gaushit__VDTDEDataPrepReco.
181835	0.000	recob::Hitrecob::SpacePointvoidart::Assns_pandora__VDTDEDataPrepReco.
160564	0.000	recob::Hitrecob::Trackrecob::TrackHitMetaart::Assns_pandoraTrack__VDTDEDataPrepReco.
129929	0.000	recob::Clusterrecob::Hitvoidart::Assns_pandora__VDTDEDataPrepReco.
124209	0.000	recob::Hitrecob::Slicevoidart::Assns_pandora__VDTDEDataPrepReco.
116155	0.000	recob::Hitrecob::Trackvoidart::Assns_pandoraTrack__VDTDEDataPrepReco.
115425	0.000	recob::Clusters_pandora__VDTDEDataPrepReco.
107456	0.000	recob::PFParticlerecob::SpacePointvoidart::Assns_pandora__VDTDEDataPrepReco.
45658	0.000	recob::Tracks_pandoraShower__VDTDEDataPrepReco.
42375	0.000	anab::ParticleIDs_pandorapid__VDTDEDataPrepReco.
31969	0.000	recob::PCAxis_pandoraShower__VDTDEDataPrepReco.
30945	0.000	recob::Showers_pandoraShower__VDTDEDataPrepReco.
27050	0.000	recob::Hitrecob::Showervoidart::Assns_pandoraShower__VDTDEDataPrepReco.
25116	0.000	recob::Showerrecob::SpacePointvoidart::Assns_pandoraShower__VDTDEDataPrepReco.
14618	0.000	recob::Vertexs_pandora__VDTDEDataPrepReco.
11136	0.000	recob::Hitrecob::Trackvoidart::Assns_pandoraShower__VDTDEDataPrepReco.
9988	0.000	recob::Clusterrecob::PFPParticlevoidart::Assns_pandora__VDTDEDataPrepReco.
9017	0.000	recob::Slices_pandora__VDTDEDataPrepReco.
7658	0.000	anab::Calorimetryrecob::Trackvoidart::Assns_pandoracalo_VDTDEDataPrepReco.
7639	0.000	anab::ParticleIDrecob::Trackvoidart::Assns_pandorapid__VDTDEDataPrepReco.
6389	0.000	recob::PFParticles_pandora__VDTDEDataPrepReco.
5697	0.000	recob::PFParticlerecob::Slicevoidart::Assns_pandora__VDTDEDataPrepReco.
5202	0.000	lanpandoraobj::PFPParticleMetadatarecob::PFPParticlevoidart::Assns_pandora__VDTDEDataPrepReco.
5037	0.000	recob::PFParticlerecob::Vertexvoidart::Assns_pandora__VDTDEDataPrepReco.
4460	0.000	recob::Clusterrecob::Showervoidart::Assns_pandoraShower__VDTDEDataPrepReco.
3549	0.000	recob::PFParticlerecob::Trackvoidart::Assns_pandoraTrack__VDTDEDataPrepReco.
3514	0.000	recob::PFParticlerecob::Showervoidart::Assns_pandoraShower__VDTDEDataPrepReco.
3453	0.000	recob::PCAxisrecob::PFPParticlevoidart::Assns_pandoraShower__VDTDEDataPrepReco.
3061	0.000	recob::PCAxisrecob::Showervoidart::Assns_pandoraShower__VDTDEDataPrepReco.
2785	0.000	art::RNGsnapshots_rns__VDTDEDataPrepReco.
2721	0.000	raw::RDStatuuss_daq__VDTDEDataPrepReco.
2667	0.000	raw::RDTimeStamps_timingrawdecoder_daq_VDTDEDataPrepReco.
2574	0.000	lanpandoraobj::PFPParticleMetadatas_pandora__VDTDEDataPrepReco.
2213	0.000	recob::Showerrecob::Trackvoidart::Assns_pandoraShower__VDTDEDataPrepReco.
1535	0.000	art::TriggerResults_TriggerResults__VDTDEDataPrepReco.
1353	0.000	EventAuxiliary

## product\_sizes\_dumper

# Event dump

PROCESS NAME.....	MODULE LABEL....	PRODUCT INSTANCE NAME	DATA PRODUCT TYPE.....	SIZE
VDTDEDataPrepReco	pandoraShower...	.....	art::Assns<recob::PFPparticle,recob::PCAxis,void>.....	..2
VDTDEDataPrepReco	pandoraShower...	.....	art::Assns<recob::Shower,recob::PFPparticle,void>.....	..2
VDTDEDataPrepReco	pandorapid.....	.....	art::Assns<recob::Track,anab::ParticleID,void>.....	..18
VDTDEDataPrepReco	pandoraShower...	.....	std::vector<recob::Shower>.....	..2
VDTDEDataPrepReco	pandoraShower...	.....	art::Assns<recob::Shower,recob::SpacePoint,void>.....	..12
VDTDEDataPrepReco	pandoraShower...	.....	std::vector<recob::PCAxis>.....	..2
VDTDEDataPrepReco	TriggerResults..	.....	art::TriggerResults.....	..1
VDTDEDataPrepReco	pandora.....	.....	art::Assns<recob::Slice,recob::Hit,void>.....	..384
VDTDEDataPrepReco	timingrawdecoder	daq.....	std::vector<raw::RDTimeStamp>.....	..1
VDTDEDataPrepReco	pandorapid.....	.....	std::vector<anab::ParticleID>.....	..18
VDTDEDataPrepReco	pandoracalo.....	.....	art::Assns<recob::Track,anab::Calorimetry,void>.....	..18
VDTDEDataPrepReco	pandora.....	.....	std::vector<recob::Vertex>.....	..8
VDTDEDataPrepReco	gaushit.....	.....	art::Assns<recob::Wire,recob::Hit,void>.....	..436
VDTDEDataPrepReco	pandora.....	.....	std::vector<recob::SpacePoint>.....	..349
VDTDEDataPrepReco	pandora.....	.....	art::Assns<recob::SpacePoint,recob::Hit,void>.....	..349
VDTDEDataPrepReco	rns.....	.....	std::vector<art::RNGSnapshot>.....	..0
VDTDEDataPrepReco	pandoraShower...	.....	art::Assns<recob::Shower,recob::PCAxis,void>.....	..2
VDTDEDataPrepReco	pandora.....	.....	std::vector<recob::Cluster>.....	..21
VDTDEDataPrepReco	pandora.....	.....	std::vector<recob::PFPparticle>.....	..8
VDTDEDataPrepReco	pandoraTrack....	.....	art::Assns<recob::PFPparticle,recob::Track,void>.....	..6
VDTDEDataPrepReco	pandora.....	.....	art::Assns<recob::PFPparticle,larpandoraobj::PFPparticleMetadata,void>.....	..8
VDTDEDataPrepReco	pandora.....	.....	art::Assns<recob::PFPparticle,recob::Vertex,void>.....	..8
VDTDEDataPrepReco	caldata.....	dataprep.....	std::vector<recob::Wire>.....	..?
VDTDEDataPrepReco	pandora.....	.....	art::Assns<recob::Cluster,recob::Hit,void>.....	..384
VDTDEDataPrepReco	wclsdatanfsp....	gauss.....	std::vector<recob::Wire>.....	1600
VDTDEDataPrepReco	pandoraTrack....	.....	art::Assns<recob::Track,recob::Hit,void>.....	..372
VDTDEDataPrepReco	pandoracalo.....	.....	std::vector<anab::Calorimetry>.....	..18
VDTDEDataPrepReco	pandora.....	.....	art::Assns<recob::PFPparticle,recob::Cluster,void>.....	..21
VDTDEDataPrepReco	tpcrawdecoder...	daq.....	std::vector<raw::RawDigit>.....	1600
VDTDEDataPrepReco	gaushit.....	.....	std::vector<recob::Hit>.....	..436
VDTDEDataPrepReco	pandora.....	.....	art::Assns<recob::PFPparticle,recob::SpacePoint,void>.....	..349
VDTDEDataPrepReco	pandoraShower...	.....	art::Assns<recob::Shower,recob::Hit,void>.....	..12
VDTDEDataPrepReco	daq.....	.....	std::vector<raw::RDStatus>.....	..1
VDTDEDataPrepReco	caldata.....	dataprep.....	art::Assns<raw::RawDigit,recob::Wire,void>.....	1600
VDTDEDataPrepReco	pandoraTrack....	.....	art::Assns<recob::Track,recob::Hit,recob::TrackHitMeta>.....	..372
VDTDEDataPrepReco	pandoraShower...	.....	std::vector<recob::Track>.....	..0
VDTDEDataPrepReco	pandoraShower...	.....	art::Assns<recob::Track,recob::Hit,void>.....	..0
VDTDEDataPrepReco	wclsdatanfsp....	wiener.....	std::vector<recob::Wire>.....	1600
VDTDEDataPrepReco	pandoraTrack....	.....	std::vector<recob::Track>.....	..6
VDTDEDataPrepReco	pandoraShower...	.....	art::Assns<recob::Shower,recob::Cluster,void>.....	..3
VDTDEDataPrepReco	pandora.....	.....	std::vector<larpandoraobj::PFPparticleMetadata>.....	..8
VDTDEDataPrepReco	pandora.....	.....	art::Assns<recob::PFPparticle,recob::Slice,void>.....	..8
VDTDEDataPrepReco	pandora.....	.....	std::vector<recob::Slice>.....	..6
VDTDEDataPrepReco	pandoraShower...	.....	art::Assns<recob::Shower,recob::Track,void>.....	..0

## Next steps

- This is a first pre-production test. It is now necessary that the analysis group checks reconstruction results and provides a feedback during [the analysis meeting on Friday afternoon](#).  
(check for bugs, check results: do they make sense? All data products are present? There is something missing? )
- I think it would also be important to define a set of “standard” distributions , to be used to check and validate any future software development of Cold-box raw data reconstruction
- Can we fix a [deadline on March 25<sup>th</sup>](#)? (two weeks from now)
- Once feedback is provided, we can move on, as detailed in slide 2
- Production has started with TDE data, but of course BDE data can be processed as well, following the same scheme (a pre-production test followed by the reconstruction of the full data sample)