Future far detector production plans

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FD sim/reco meeting
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Future production

- A new production is being planned to replace the old (2018) MCC 11 production. A non-exhaustive list of improvements/features:

    - 2D signal simulation/processing via wirecell (BNL team)

    - Data driven noise simulation (D. Adams)

    - Refactored LArG4 (H. Wenzel)

    - Recurrent neural network-based energy reconstruction (D. Torbunov, G. Pawloski)

    - Assorted Pandora pattern recognition improvements (Pandora team)

- The 'standard' dunetpc far detector sim/reco workflow is being reconfigured to include the refactored LArG4 and wirecell. Some of dunetpc is also getting a spring clean

    - Ongoing reorganisation is happening here: feature/dbrailsf_refactor

Reorganisation of dunetpc fcl structure

- services_dune.fcl has become bloated, containing ~900 lines of FCL

- Experiment-specific services have been separated into their own dedicated fcls e.g.

  - services_dunefd_horizdrift.fcl

  - services_dunefd_vertdrift_1x6x6.fcl

- services_dune.fcl now only collects the experiment services together

```
[dunegpvm06.fnal.gov@Utilities]$ cat services_dune.fcl
#include "services_35t.fcl"
#include "services_dunefd_horizdrift.fcl"
#include "services_dunefd_horizdrift_1x2x6.fcl"
#include "services_dunefd_vertdrift.fcl"
#include "services_dunefd_vertdrift_1x6x6.fcl"
#include "services_dunefd_dualphase.fcl"
#include "services_dualphase_3x1x1.fcl"
#include "services_protodune_dualphase.fcl"
#include "services_protodune_singlephase.fcl"
```

# Reorganisation of dunetpc fcl structure

- All 'refactored' fcls/ services drop their refactored label

- The older fcls/services pick up a 'legacy' label

- Geometry files are not being renamed

```
dunefd_simulation_services_legacy: {
  LArFFT:                        @local::dunefd_larfft
  LArG4Parameters:               @local::dunefd_largeantparameters
  ExptGeoHelperInterface:        @local::dune_geometry_helper
  GeometryConfigurationWriter:   {}
  Geometry:                      @local::dune10kt_geo
  DetectorClocksService:         @local::dunefd_detectorclocks
  DetectorPropertiesService:     @local::dunefd_detproperties
  LArPropertiesService:          @local::dunefd_properties
  DatabaseUtil:                  @local::dunefd_database
  LArVoxelCalculator:            @local::dunefd_larvoxelcalculator
  MagneticField:                 @local::no_mag_larsoft
  BackTrackerService:            @local::dunefd_backtrackerservice
  ParticleInventoryService:      @local::standard_particleinventoryservice
  PhotonBackTrackerService:      @local::dunefd_photonbacktrackerservice
  SpaceCharge:                   @local::dunefd_spacecharge
  NuRandomService:               @local::dune_seedservice
  SignalShapingServiceDUNE:      @local::dunefd_signalshapingservice
  OpDetResponseInterface:        @local::dunefd_opdetresponse
  ChannelStatusService:          @local::dunefd_channel_status
}
```

```
dunefd_simulation_services: {
   @table::dunefd_simulation_services_legacy
   @table::common_larg4_services
   NuRandomService:        @local::dune_prod_seedservice
   ParticleListAction: @local::dune_particle_list_action
   PhysicsList:            @local::dune_physics_list_fastoptical
   #LArG4Detector:         No refactored full FD geom, required for this to run
   PhotonBackTrackerService: @local::dunefd_photonbacktrackerservice_refactor
   PhotonVisibilityService: @erase
}
```

Modifying the FD workflow

- The general horizontal drift far detector workflow has been reconfigured to include the refactored LArG4 (A.Himmerl and B. Behera) and wirecell (H. Yu)

  - This includes one particle gun generator-level fcl. More will follow

- RHS display shows pandora-reconstructed muon simulated using refactored LArG4 + wirecell
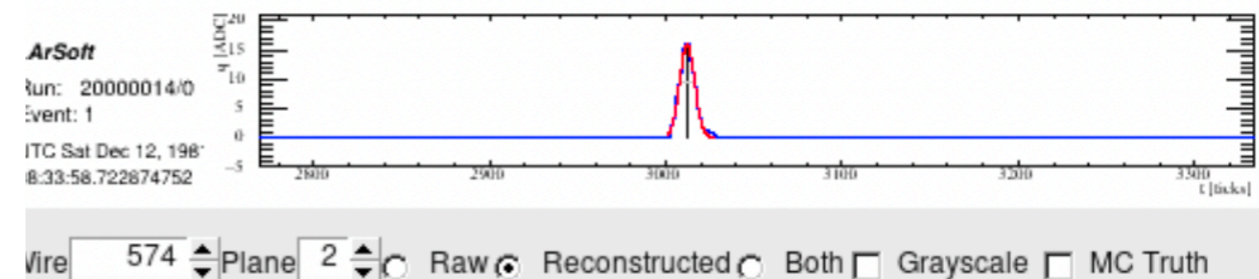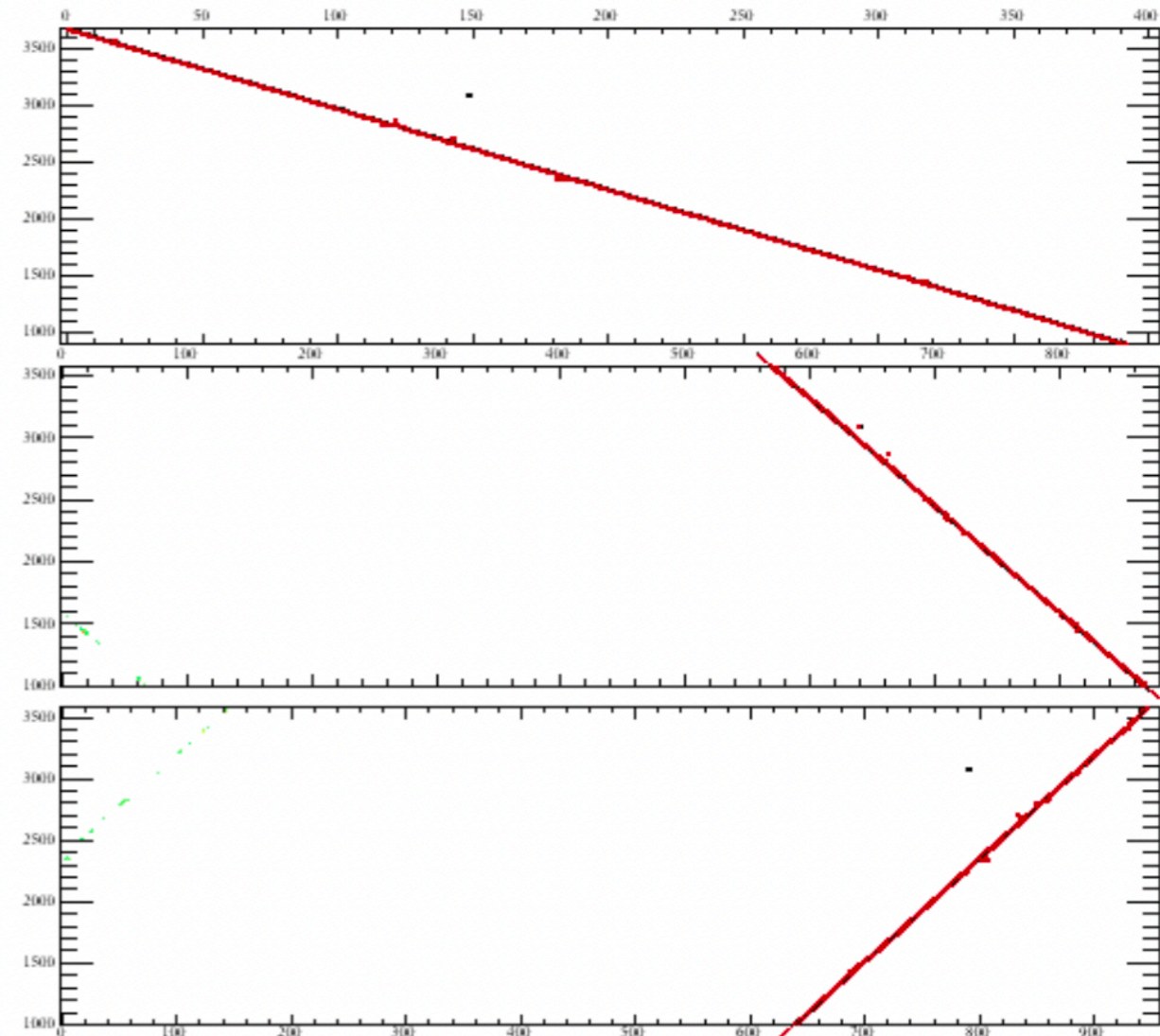
TODO

- Verify the wirecell signal simulation/processing is working as intended in the new workflow (H. Yu)

- DataPrep (D. Adams)

- Hit reconstruction checking/tuning

- Calorimetry constants (Needs liaison with calibration group)

- Recreate the necessary generator level fcls

- Volunteers are, of course, welcome

Future far detector production

- We will most likely be requesting the usual LBNF oscillation analysis samples for the production: 'nu', 'nue' and 'nutau'

  - Statistics TBC

  - Start date TBC: will be discussed in the parallel sessions at the collaboration meeting

- Inputs here (desired samples, statistics etc.) are very welcome

Collaboration meeting sessions

- We've requested two parallel sessions

- Please start thinking about presentations at the collaboration meeting and get in touch if you'd like to present