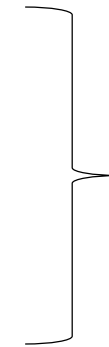


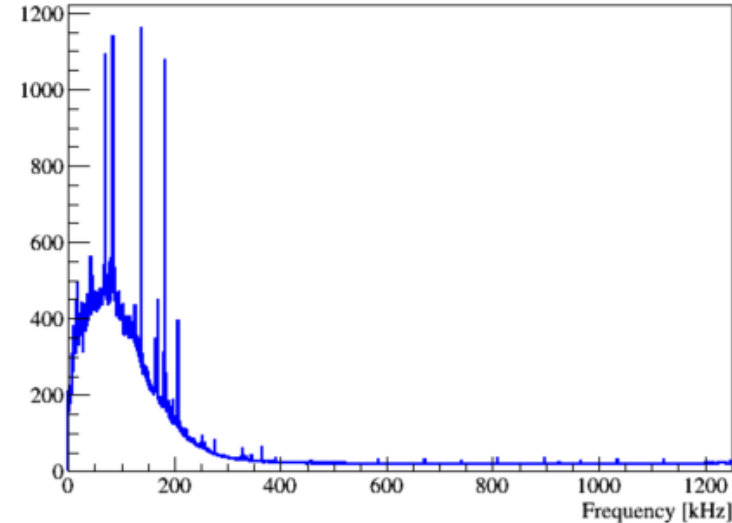
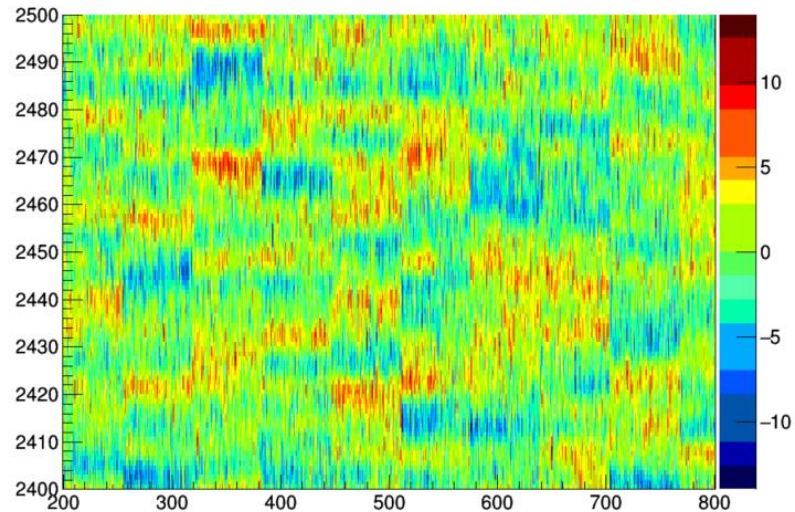
Roadmap of WireCell toolkit in ICARUS

- Data quality monitoring
- TPC simulation
 - Coherent noise model, wire geometry, electronics shaping
 - Raw digits
 - SimChannel
- Signal processing (conventional)
- E-field: transparency study
- 3D imaging
- Flash-charge matching



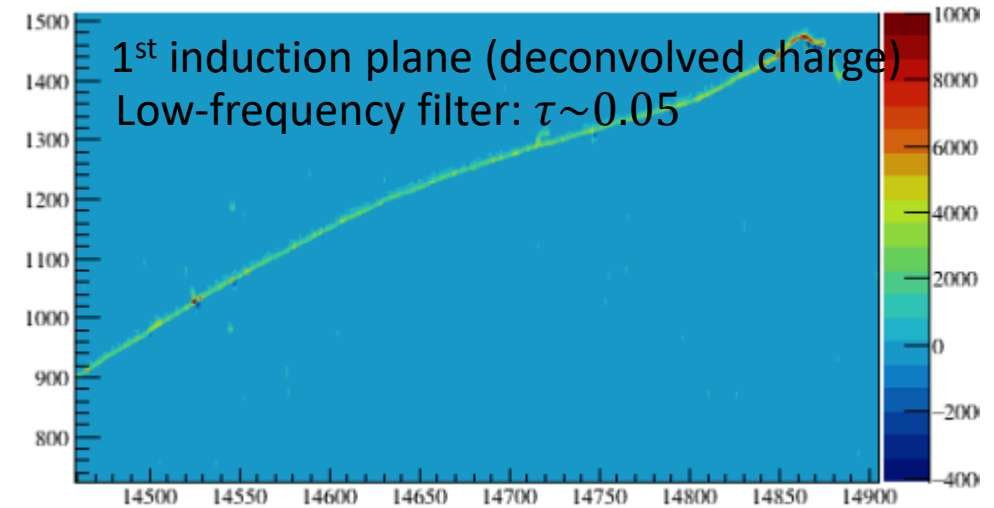
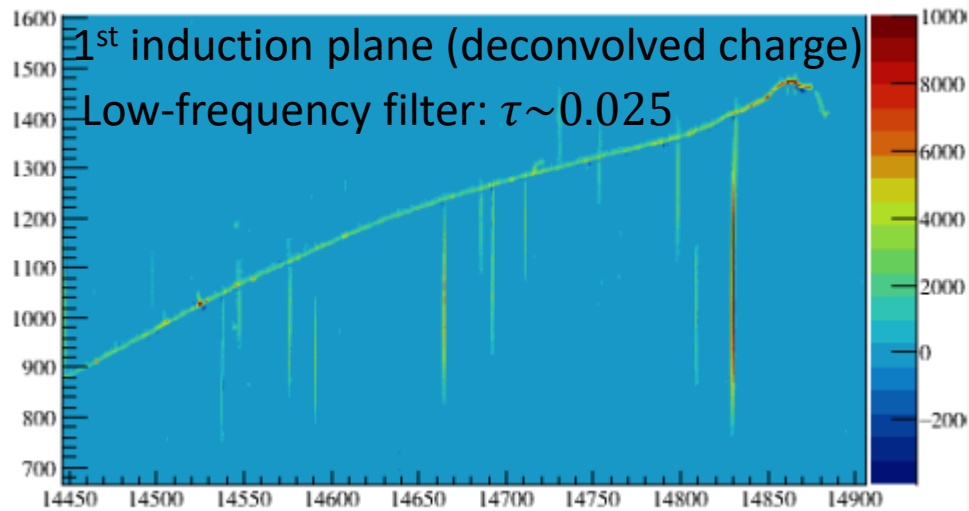
Request a new release

Data quality monitoring

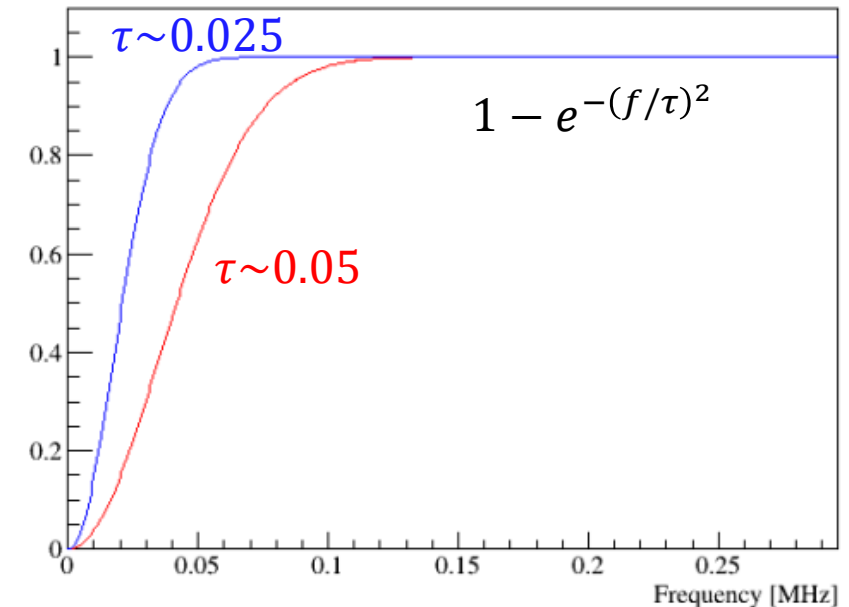


- WireCell analysis module
 - Example: <https://github.com/WireCell/example-analysis-package.git>
- Provide some diagnostic plots
 - A crosscheck in addition to other efforts (Justin, Christian, etc.)
 - RMS vs. time, outlier frequency vs. time

Signal processing

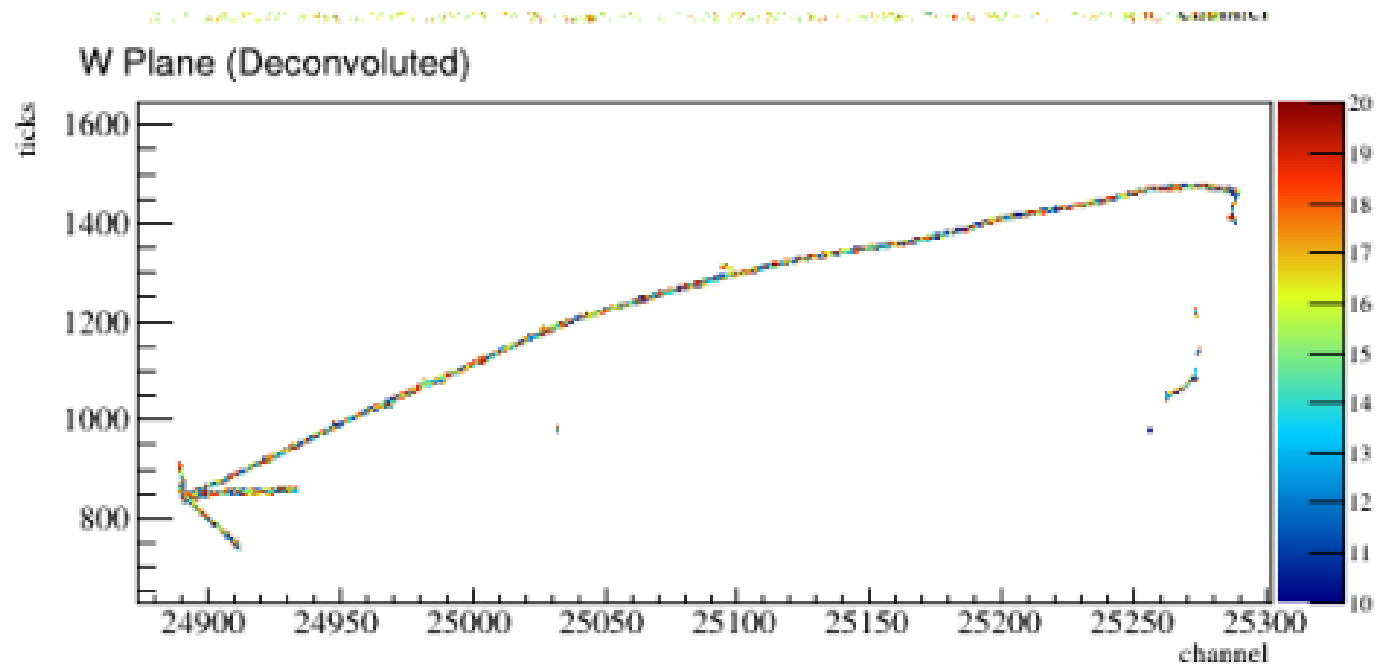


- Tighter LF filter works better!
- For the first round of release, scan a few simulation events
- Improve the quality and provide metric evaluation later



TPC simulation

- Take energy depositions from Geant4
- Simulate
 - Electron drift
 - Field response
 - Electronics shaping (Andrea)
 - Coherent noise (Andrea)
- Provide
 - RawDigits
 - SimChannel



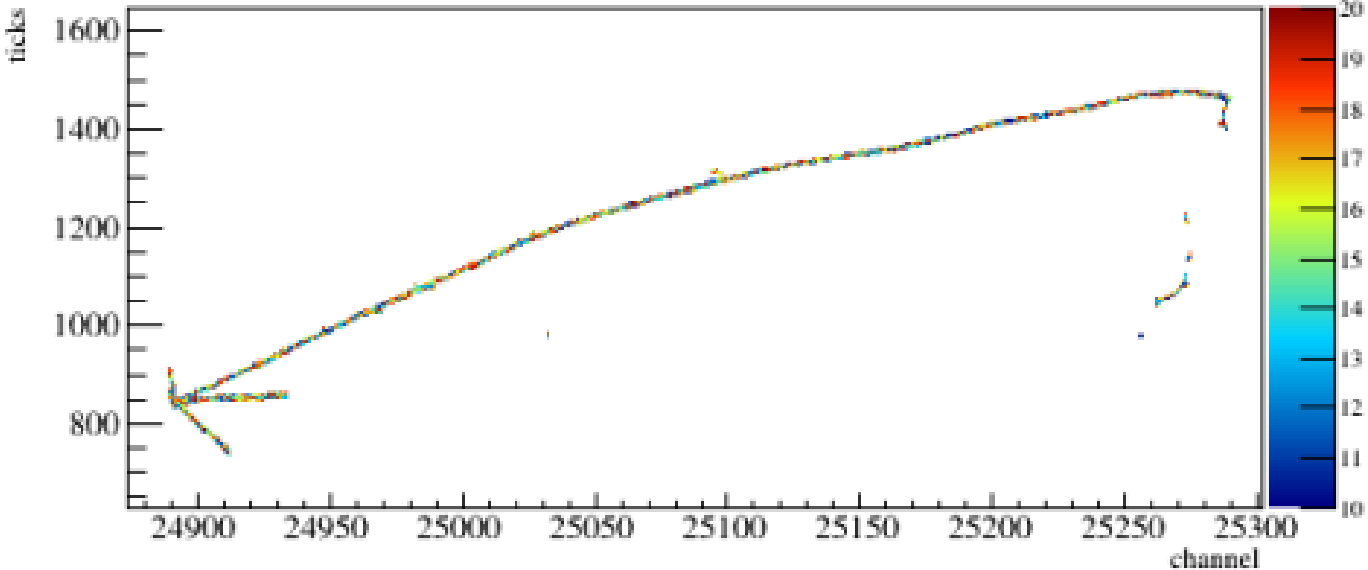
SimChannel TDC offset

Tick~1100, tdc~8717

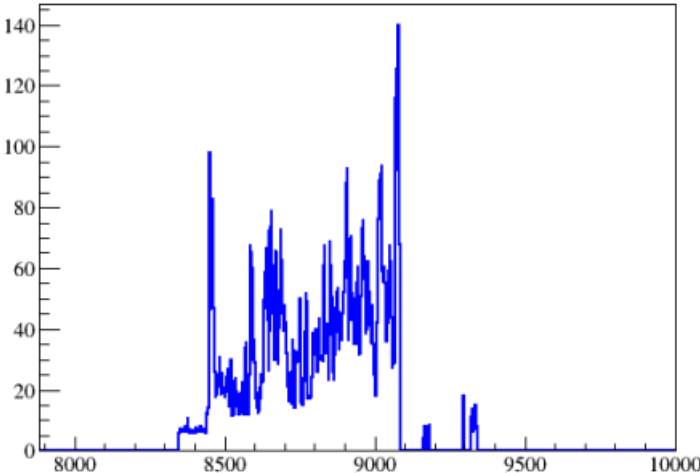
Tick~1400, tdc~9015

~ 7600 ticks offset in SimChannel::"TDC"?
Possible reason: time offset for pre-trigger window

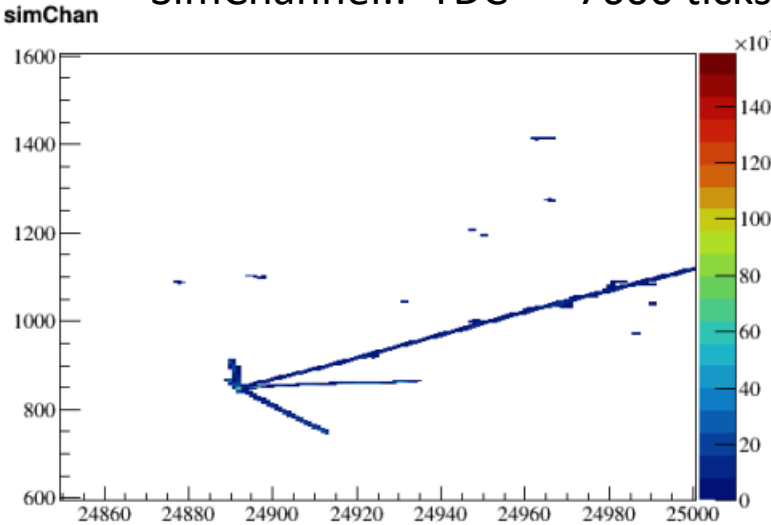
W Plane (Deconvoluted)



SimChannel::"TDC"



SimChannel::"TDC" - 7600 ticks



```
// detectorclocks_icarus.fcl
icarus_detectorclocks: {
    service_provider: "DetectorClocksServiceStandard"

    G4RefTime:          -1.15e3 # G4 time [us] where electronics clock counting start
    TriggerOffsetTPC:  -0.340e3 # Time offset for TPC readout start time w.r.t. trigger [us]
    DefaultTrigTime:   1.15e3 # Default trigger time in electronics clock [us]
    DefaultBeamTime:   1.15e3 # Default beam gate time in electronics clock [us]

} # icarus_detectorclocks
```

ICARUS

```
// detectorclocks_dune.fcl
# Implement new 6000 tick readout window (500 before trigger, or 250 us)
protodune_detectorclocks: @local::standard_detectorclocks

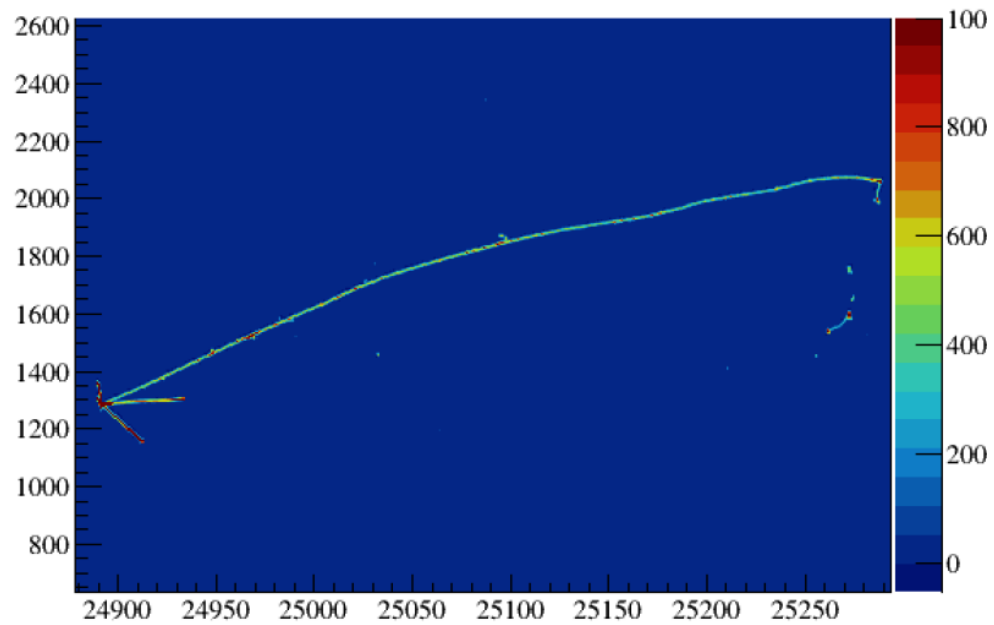
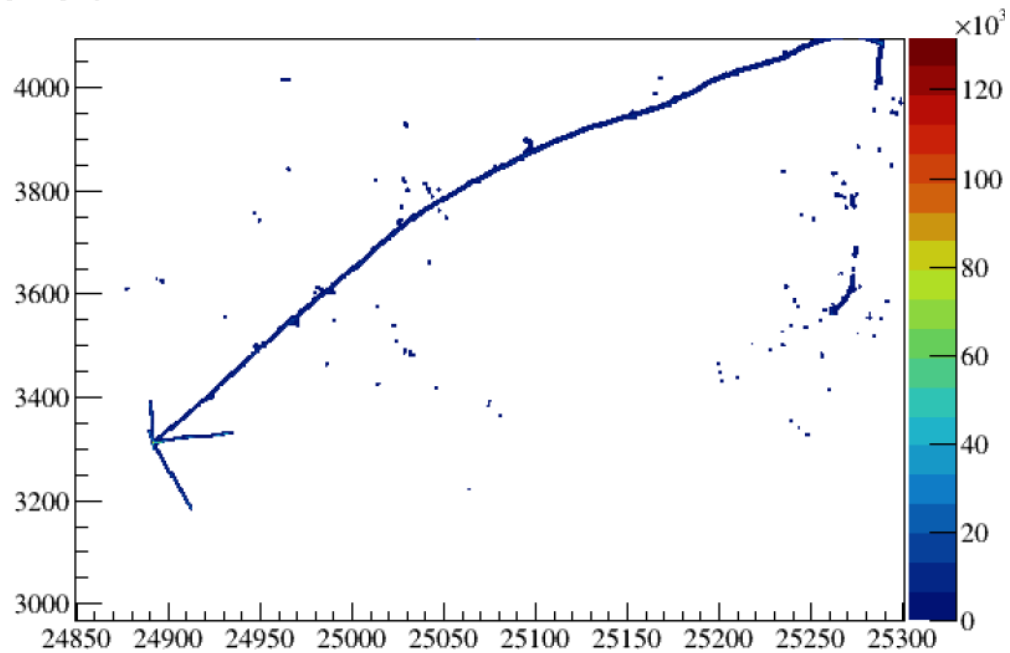
protodune_detectorclocks.G4RefTime:          -250. # G4 time [us] where electronics clock counting start
protodune_detectorclocks.TriggerOffsetTPC:  -250. # Time [us] for TPC readout start w.r.t. trigger time (500 ticks)
protodune_detectorclocks.DefaultTrigTime:   250. # Default trigger time [us].|
protodune_detectorclocks.DefaultBeamTime:   250. # Default beam time [us].
```

pDSP

```
microboone_detectorclocks: @local::standard_detectorclocks
```

```
microboone_detectorclocks.G4RefTime:          -4.05e3 # G4 time [us] where electronics clock counting start
microboone_detectorclocks.TriggerOffsetTPC:  -1.6e3 # Time [us] for TPC readout start w.r.t. trigger time
microboone_detectorclocks.DefaultTrigTime:   4050. # Default trigger time [us].
microboone_detectorclocks.DefaultBeamTime:   4050. # Default beam time [us].
```

MicroBooNE

calib**simChan**

- Now it has 810us time offset
- Looks reasonable since it has 810us difference between G4RefTime and StartTime
 - SimChannel::TDC counts from G4RefTime