Configuring WCT for running in art/LArSoft for DUNE

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Topics

- My understanding of what we are doing.
- Survey of “DAQ related” WCT configuration parameters.
- Passing values from FCL to Jsonnet.
- Grander schemes for configuration organization.

Why are we here

DUNE has generally moved from 12 to 14 bit ADC resolution.

- Historic PDSP is 12 bit.
- Many other detectors supported by WCT have not.

We want to find a “best” way to make this change.

- Consider what other parameters should be considered.
- Consider what makes sense to define in FCL or in Jsonnet.

Maybe consider this an excuse to greatly simplify DUNE config.

- And, maybe both Jsonnet and FCL sides.

An incomplete survey of “DAQ related” parameters

Up to the production of raw ADC waveform

drift	DL, DT, lifetime, drift speed, “xregions” (anode/response/cathode planes)
signal	2D field responses, readout window times, tick, drift speed,
noise	average spectra, channel groups
digitzer	electronics response, relative gain, ADC resolution, scale and baselines.

Direct consumers of raw ADC waveforms

noise filter	2d field, tick, channel groups,
sigproc	2D field, elec and RC responses, ADC/mV, various filters

An important intermediate configuration structure : `det.volumes`

Array of per `AnodePlane` (APA) objects, each giving:

- The **anode ident** number to match entries in the "wires file"
- A per-"face" object giving **xregions**.

This data structure algorithm-generated in Jsonnet with **per-detector code**.

- Minor challenge if `det.volumes` is a candidate for hoisting into FCL **and** if we strive for generality.
- Of course, copy-paste-modify is always an option.

FCL → Jsonnet

Sending FCL to the `WireCellToolkit` *art* "module"

```
params: {  // For Jsonnet values
  reality: "data"
}
structs: {  // For Jsonnet code
  driftSpeed: 1.565 // implicit units!
}
```

Receving with Jsonnet's `std.extVar()`

```
local drift_speed = std.extVar('driftSpeed') * wc.mm / wc.us,
```

- **Must** apply LArSoft units to LArSoft values in Jsonnet to match WCT system-of-units.
- Use of `std.extVar()` requires FCL to supply the parameter.
  - No "option with default value" pattern.

FIN

Backups