

# DAQ Needs from Calibrations

- What DAQ needs from calibration SYSTEMs
- What DAQ needs to know from calibration TF

# Current DAQ Paradigm

- All data from front-end is passed to a temporary buffer, without zero suppression ( $\sim 10$  Tb/s/10 kt)
  - Rationale: simplicity, preserves flexibility
- Trigger “primitives” from collection wires are passed to data selection
  - Integrated charge, time, time-over-threshold
- If an interaction is above threshold-equivalent (e.g., 10 MeV), 5.4 ms of data from all channels is stored
  - Rationale: best to have low bias at channel-level for “good events”
  - Rationale: u/v zero suppression is still evolving and is noise-sensitive
  - Rationale: neutrons from cosmics and other events may travel far
- For some trigger streams (e.g., random triggers) ZS can be used after trigger because either it is simple (1 hit wire per view like  $^{39}\text{Ar}$ ) or the time of track is well known (e.g., laser)

# DAQ Needs from Calibration Systems

Three (four?) possible generic systems so far:

- Laser
- Radioactive sources (includes neutron source)
- CRT
- LEDs for PDS?

DAQ will always need a way of knowing when a source is being used=**Run Type**

And/Or what time a calibration event has been generated=**Trigger Type**

While we always prefer to drive the latter---force the trigger from the DAQ---it may not always be possible.

# DAQ Needs from Calibration TF

- How many calibration sources will there be?

## And for each source:

- Can they be run with detector “live” to other physics?
- Can the source be triggered, or will it provide a trigger?
- What is rate of source?
- What is rate of events to be recorded?
- Can zero-suppression be used for signals?
- Will it provide a timestamp and if not, is latency known and constant? And how will it be synchronized?
- How much of the detector will be illuminated? (Can we partition detector?)
- (I don't understand Georgia's question about argon flow calibration).

# Constraints on Calibration Sources

- Other than random triggers, it is anticipated that the TPC threshold will be  $>10$  MeV for normal running
- If event rate in detector is  $1/2.25$  ms=400 Hz this is DC running and  $t_0$  is useless
- If event rate in detector is such that there is more than 1 event in 2.25 ms, determining  $t_0$  will require position reconstruction with photon system or some other method
- If event rate in detector is  $> 0.5$  Hz, in existing paradigm event builder cannot keep up
- If event rate in detector is  $> 1.6 \times 10^6$ /year, you are dominant source of data for DUNE (unless events are zero-suppressed or geo-suppressed)
- Self zero-suppression of u/v wires means you lose field response information, and probably can't do 3D recon