

DUNE Data Selection: Downselecting “ROIs” within Trigger Records, and the Impact on DUNE Physics

DUNE LE Physics, DAQ Physics Performance, and DAQ Data Selection WG Convners
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Maximizing trigger rate

To be able to trigger at a higher trigger rate, and especially as we push toward lower-energy thresholds where we are dominated by radiological and neutron backgrounds, we may need to rethink how much and what data we save, per trigger record.

Default is all APAs (+PDS) of a given module.

Dropping entire APAs when APA activity during the readout window is below a certain level is flexibility already built into the design.

What if we need to reduce data more aggressively?

Further reducing data volume

Considerations: (see also [dune-docdb 16982](#) by J. Klein)

Options being considered are subject to information loss.

We want to keep sufficient data to:

1. Perform operations such as deconvolution, with minimal signal efficiency impact
2. Be able to study associated low-energy activity surrounding the primary activity that might otherwise be removed from the trigger record

→ affects what might be the “minimum window” to keep around a “found activity”
 (“Region of Interest”)

We want to minimize proliferation of data formats

Further reducing data volume

Options include:

1. Channel-by-channel (1D) zero-suppression (vs. time)
 - a. At what (baseline-subtracted?) threshold?
 - b. What are the absolute minimum ROI lengths (in time) needed for (1D) deconvolution?
 - c. How do we deal with APA boundaries?
2. Channel masking (channel-wise suppression, for fixed-time-length readout)
 - a. Not so effective for u/v because of wrapping
3. 2D ROI finding (in channel and time space)
 - a. Based on what activity?
 - b. What are the absolute minimum ROI lengths (in time and channel space) needed for 2D deconvolution? Do they have to align in time and space (rectangular area)?
 - c. How do we deal with APA boundaries?
4. For all of the above, should PDS data span the same time?

