# DUNE Resampling

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September 24, 2025

# Context and Issues

$$\text{DAQ} \rightarrow (\text{files}) \rightarrow \text{Offline Software}$$

DUNE PD/FD TPC detectors produce data with $500\,\text{ns}$ and $512\,\text{ns}$ sampling periods.

## Sampling period variety passes on **complexity issues** to Offline Software

Mental:

- Thinking in two slightly different frequencies.
  - Mental math on $1.953\,125\,\text{MHz}$ is harder than $2.0\,\text{MHz}$.

Configurations:

- The two “tick” values must be set in many places, differently and depending on context.
- The Field Response calculations need redoing, with 2 needed for “identical” VD halves.

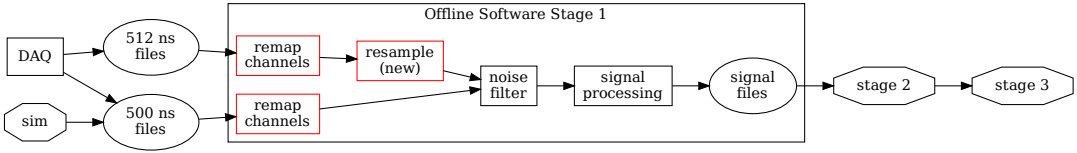
Algorithms:

- Stitching 3D clusters across TDE/BDE or HD/VD faces discrete misalignment problems.

# Motivation for Offline resampling of ADC waveforms

Resampling will remove the complexity issues passed to Offline Software in **one place** instead of solving the same problem in many places throughout the large software chain.

# Implementation in Offline Software




Almost all of stage 1 and all of stage 2+ do not see complexity of two sampling periods.

- Offline already **remaps** all online channels to a common offline number scheme.

# Some anticipated Q&A

## Why resample (half of) VD?

Required for time alignment across the two halves.

## Why $512\,\mathrm{ns} \rightarrow 500\,\mathrm{ns}$ instead of *vice versa*?

This is an upsampling and is information lossless. The other direction is lossy.

## Why resample HD?

For consistency across all PD / FD.