50-L avg μ signals in sim/data

Plus 3-view response update

Brett Viren

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Topics

2-view:

Goal more checks of 50-L "3D $\rightarrow$ 2D" response

Process compare "average waveform" between raw sim and det data

3-view:

- responses + simulation + sigproc + some bug

2-view 50-L sim/data “average waveform” check

Simulation

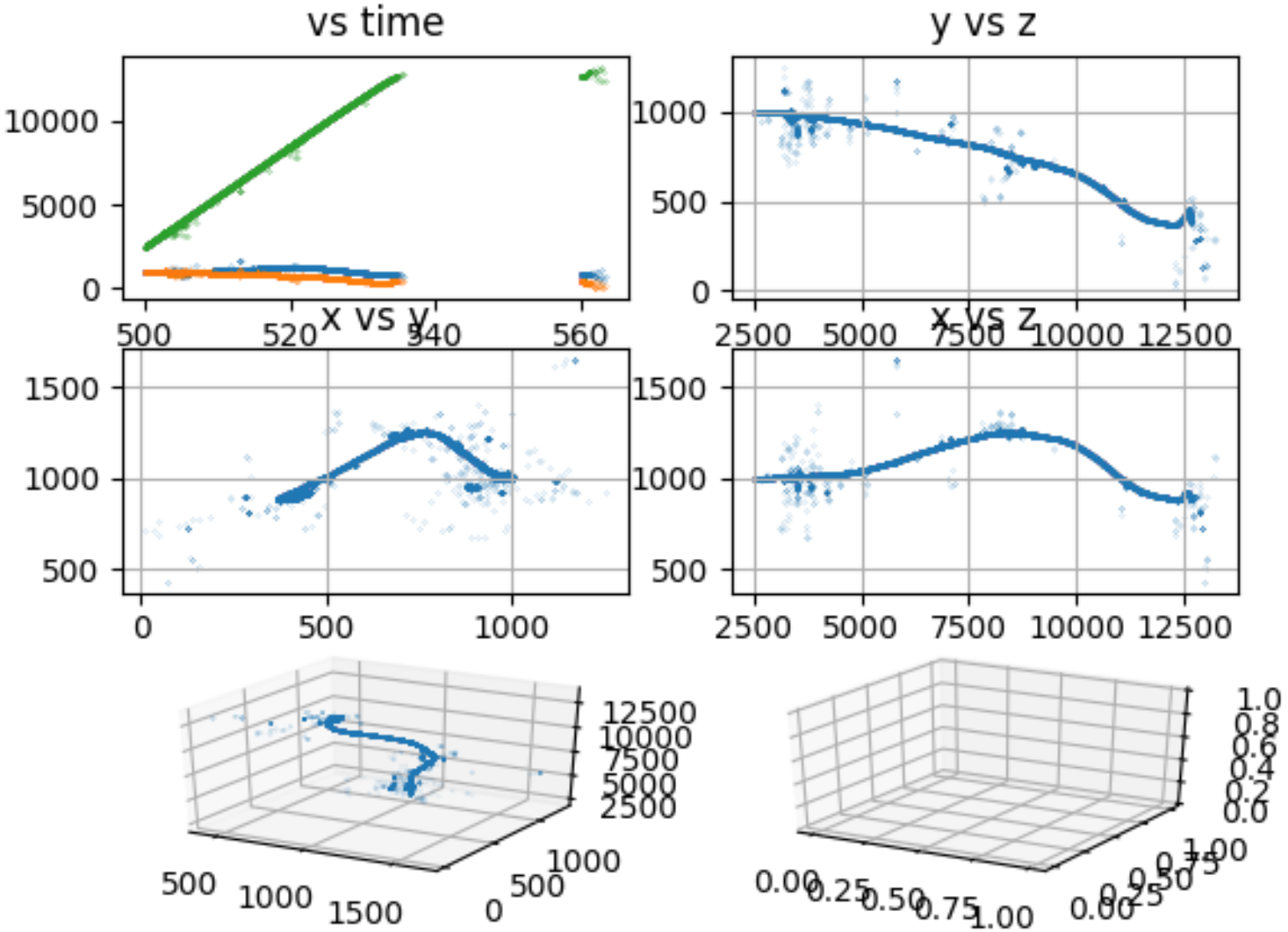
- Cosmic-μ depos from LS/WCT FD simulation job
  - Thanks Haiwang for providing!
- Manually select and transform depos for a MIP'ish track segment to approximately match 50-L track trajectories seen in data.
- Load selected depos into WCT sim using 50-L geometry and Francesco's 50-L responses
  - note, simulation has noise turned OFF!

Visualize depo selection steps

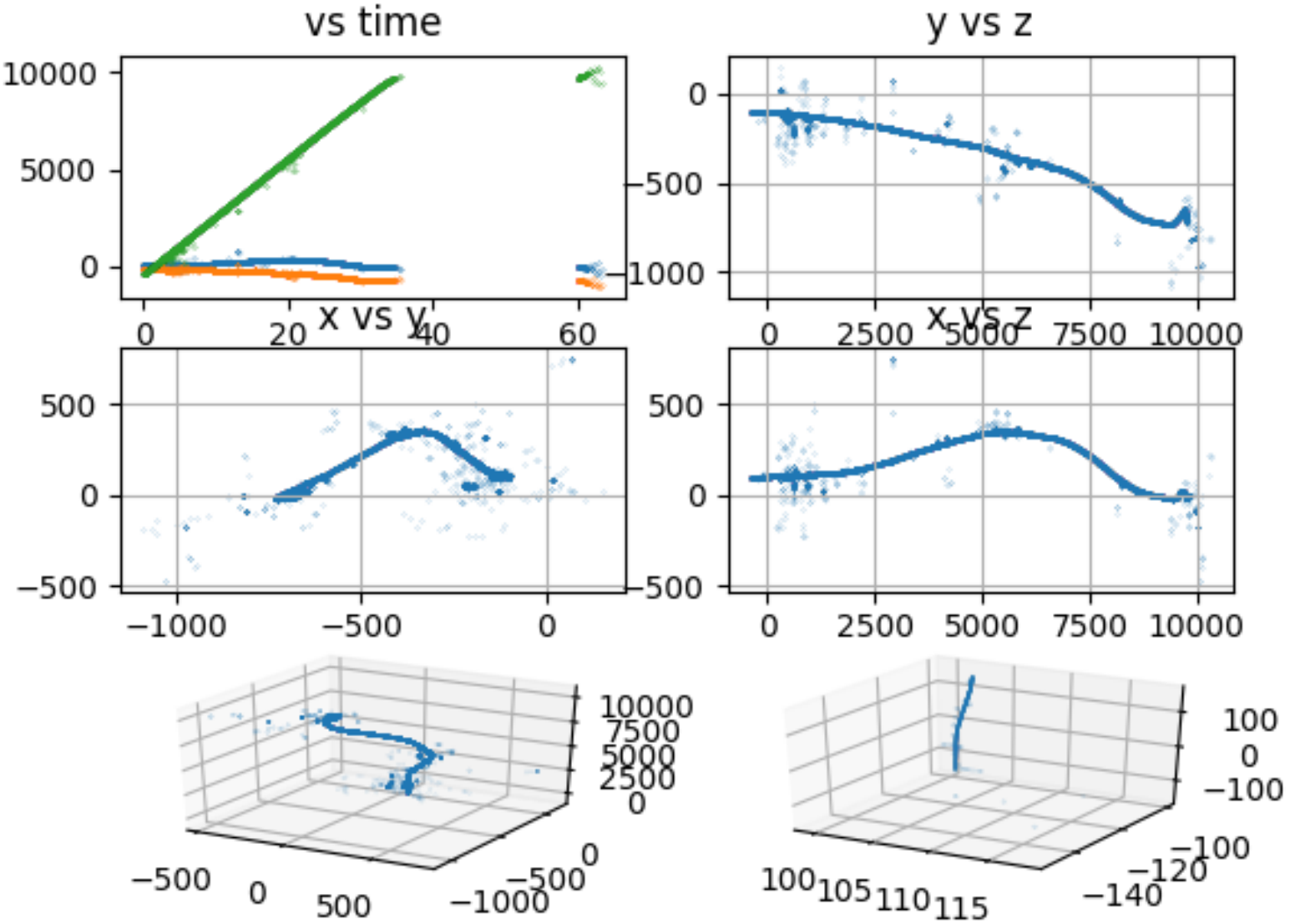
Layout of next slides.

XYZ vs time	Y *vs* Z
X *vs* Y	X *vs* Z
3D full	3D zoom to 50L

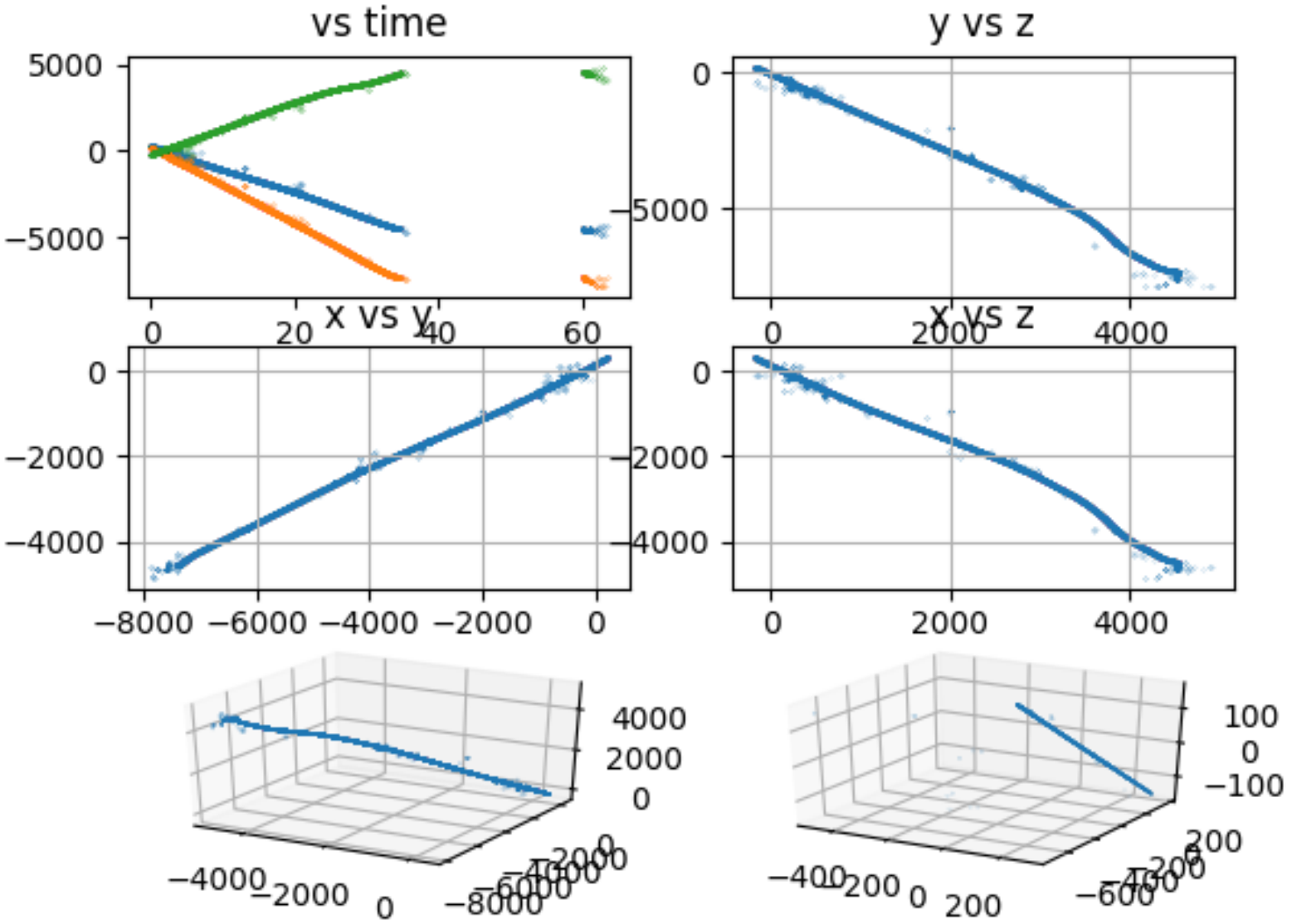
Simulation selection - full



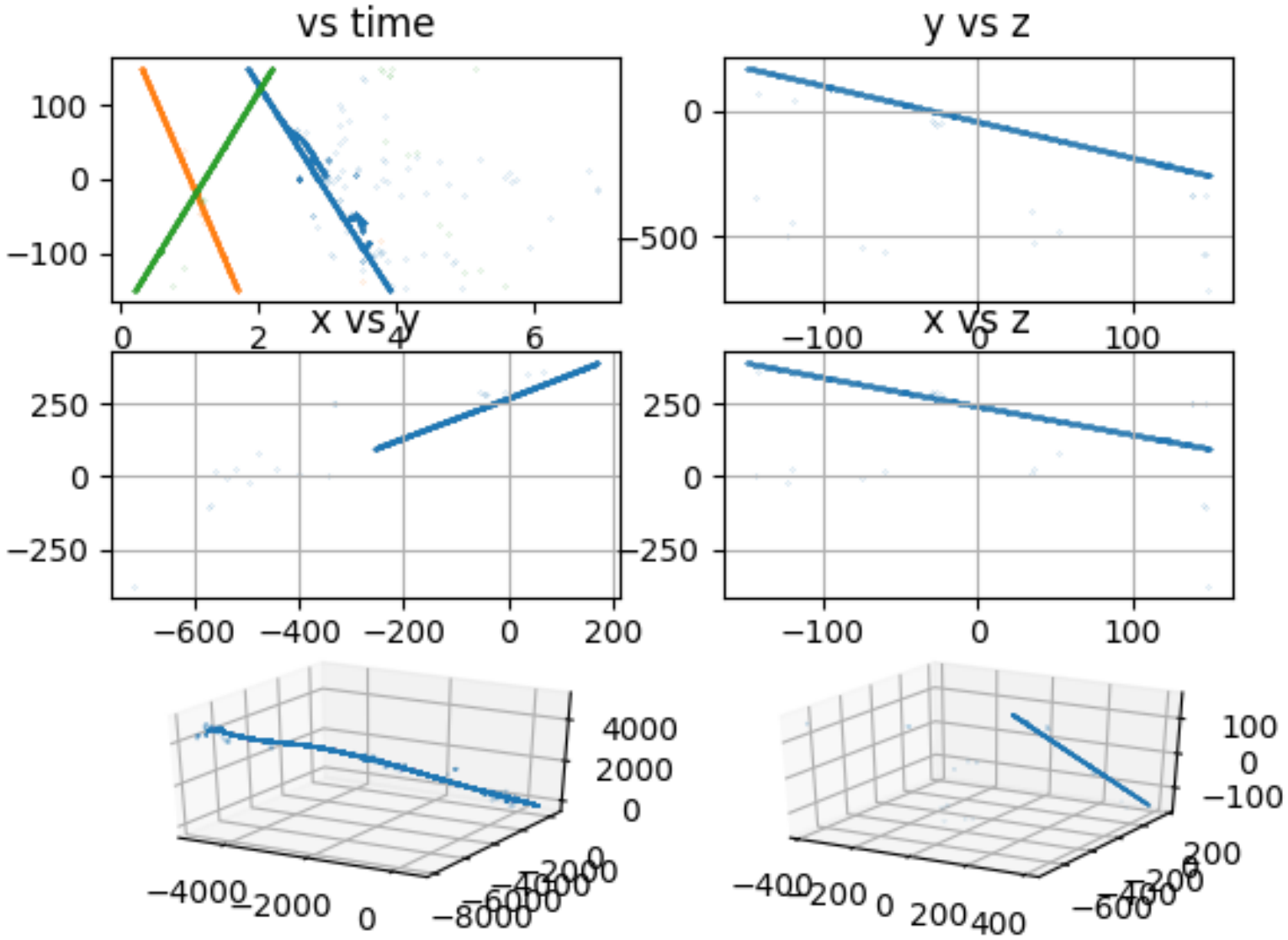
Simulation selection - center



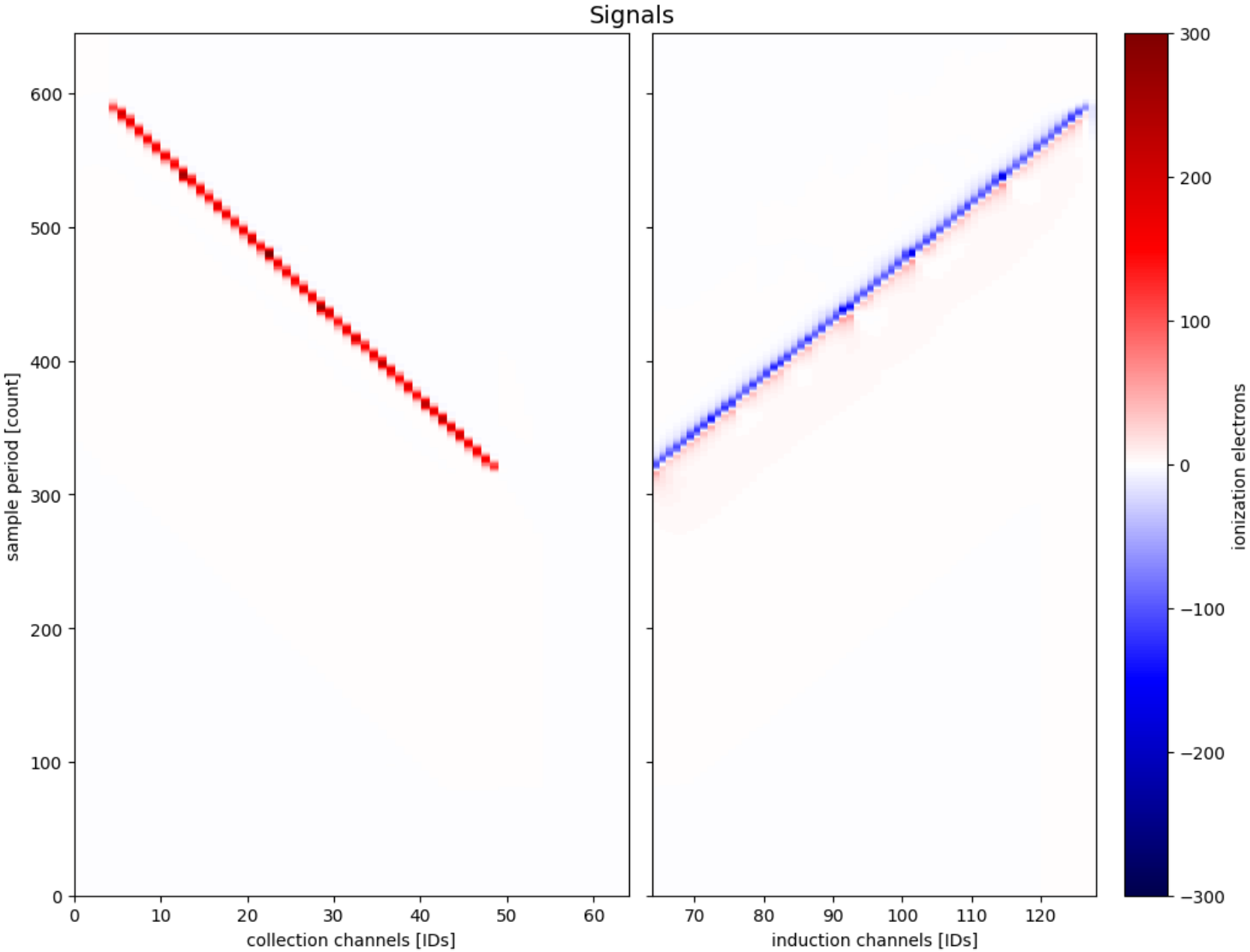
Simulation selection - rotate



Simulation selection - translate and crop

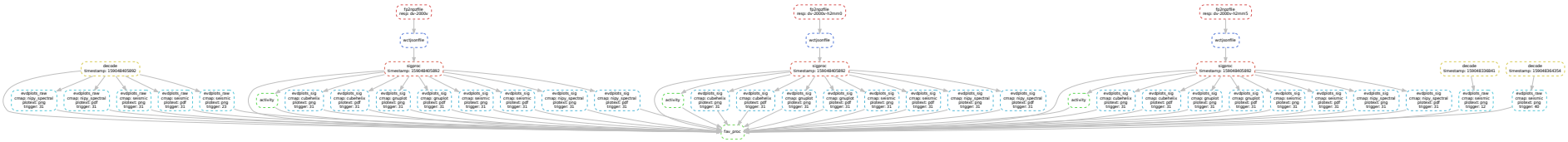


Simulation result - raw



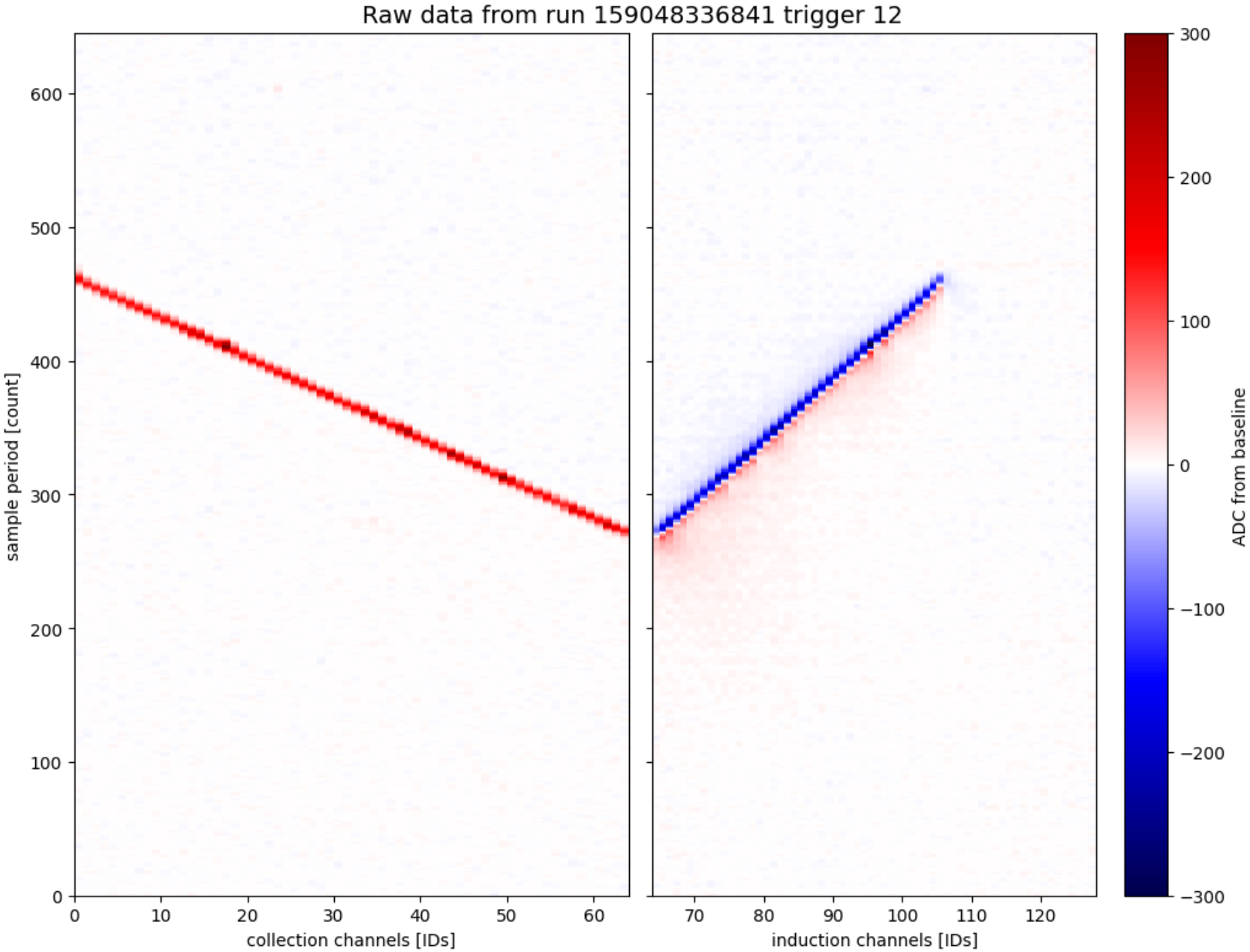
Data selection

- Use pcbro's tools to:
  - decode and run sigproc and "interesting activity selection"
  - can raw "interesting" triggers
  - select a few with MIP'ish tracks

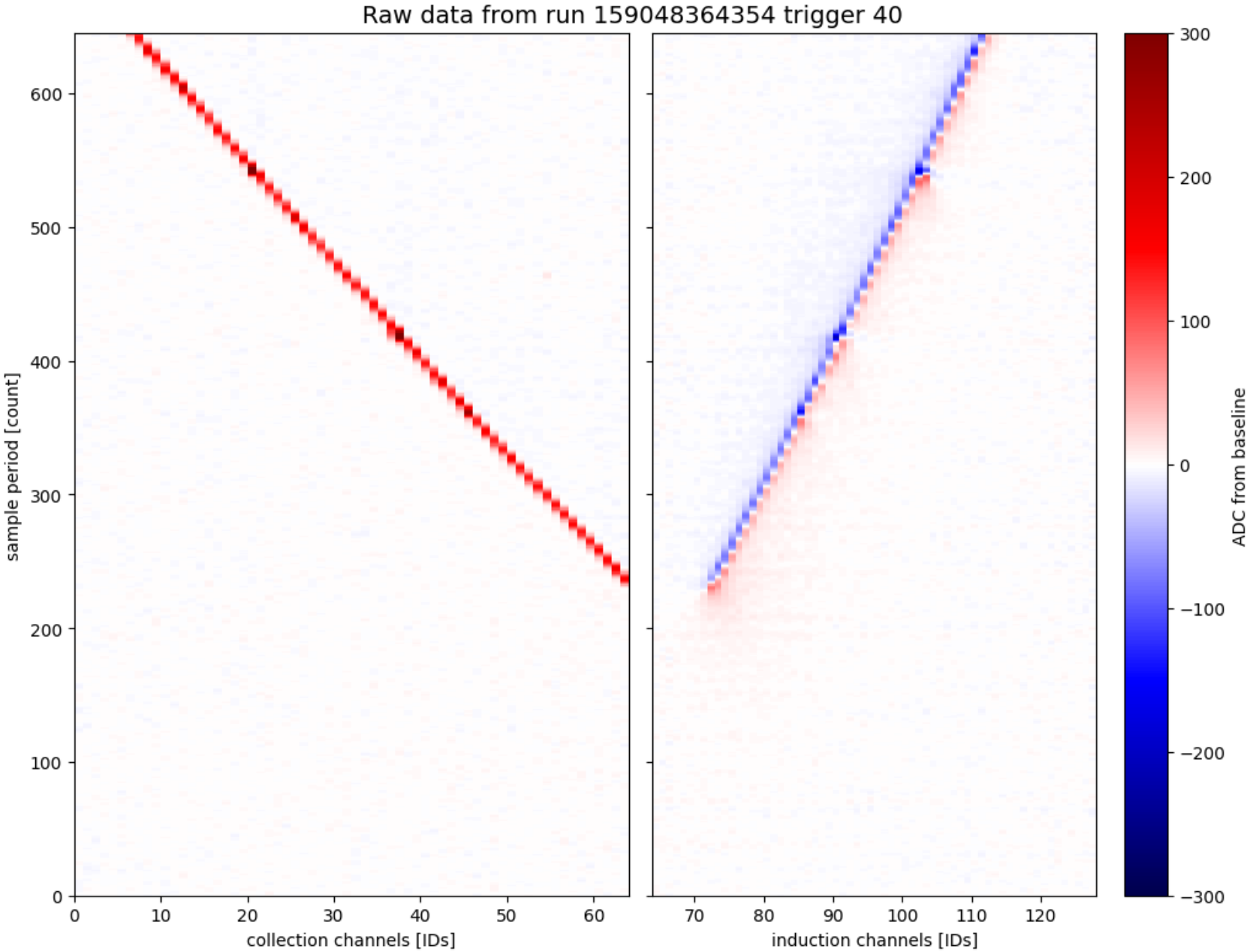


snakemake DAG for field file, sim, data, sigproc

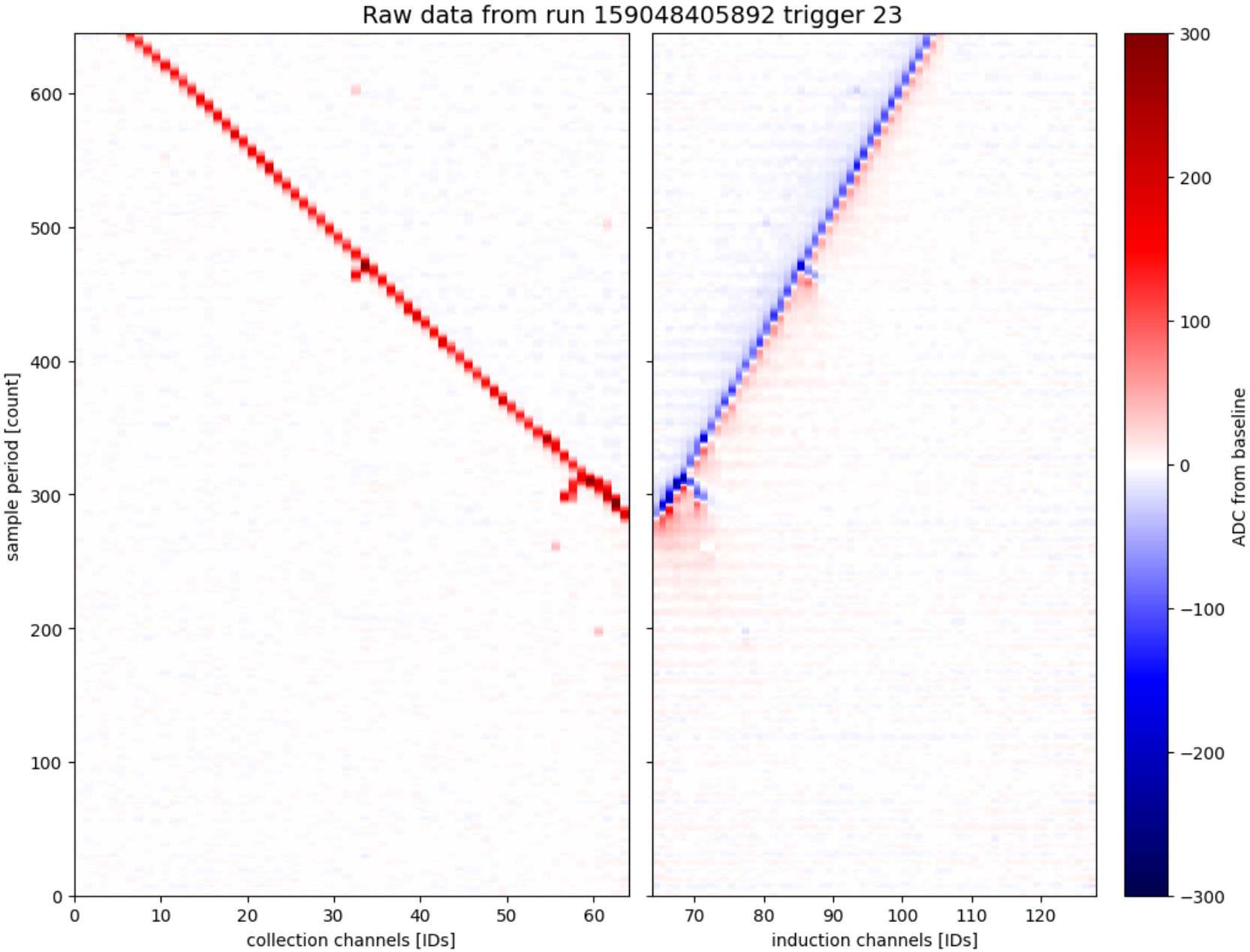
50L event - 159048336841-12



50L event - 159048364354-40

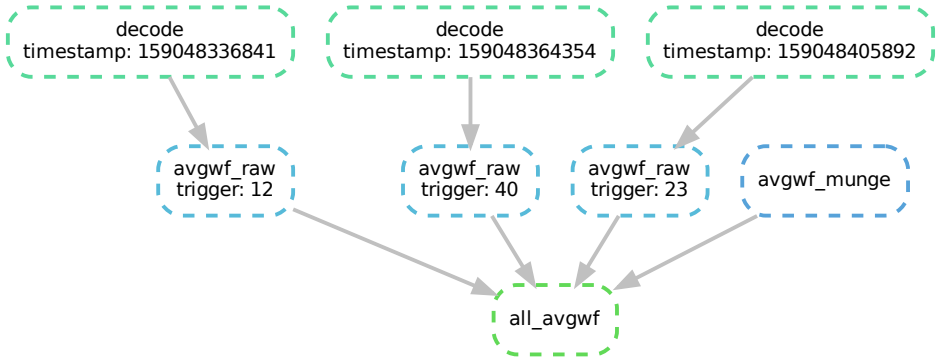


50L event - 159048405892-23



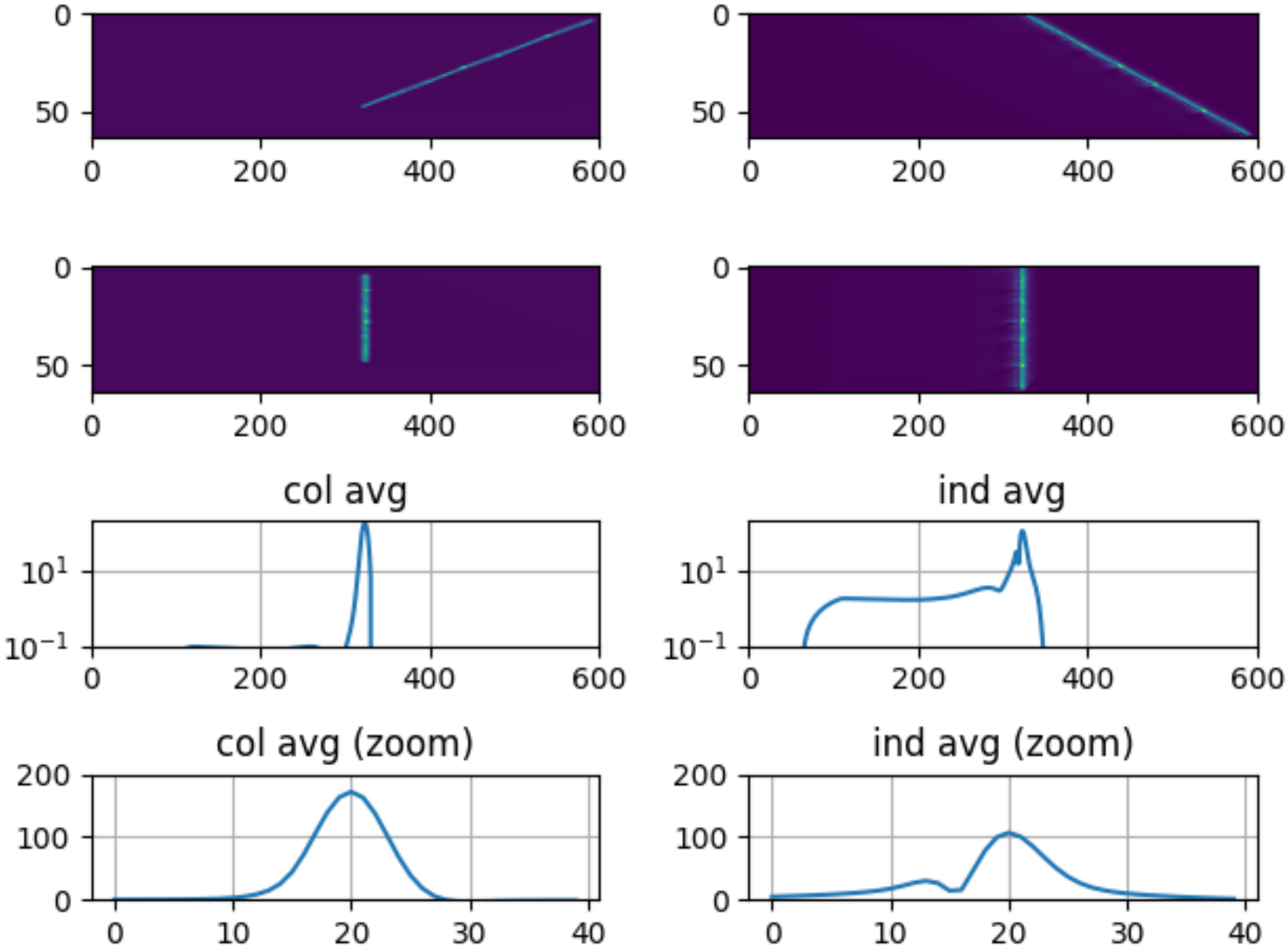
Average waveform

- Process sim or real “raw” data as Numpy arrays
- Subtract median baseline
- Find peak of absolute value
  - folds induction waveform to be all positive
- Shift waveform in time to center on peak
- Average across channels
- Make some plots

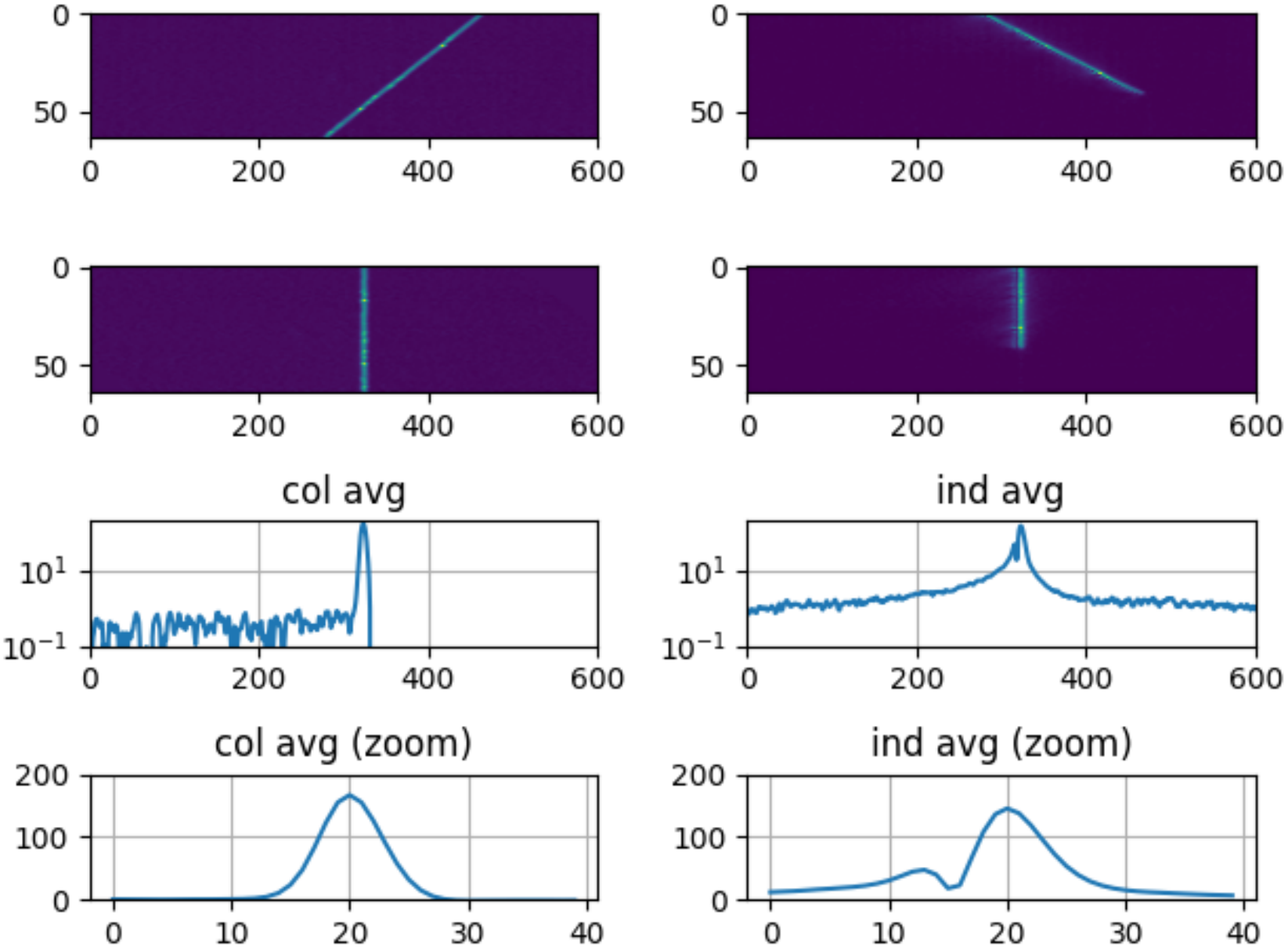


snakemake DAG for average waveform

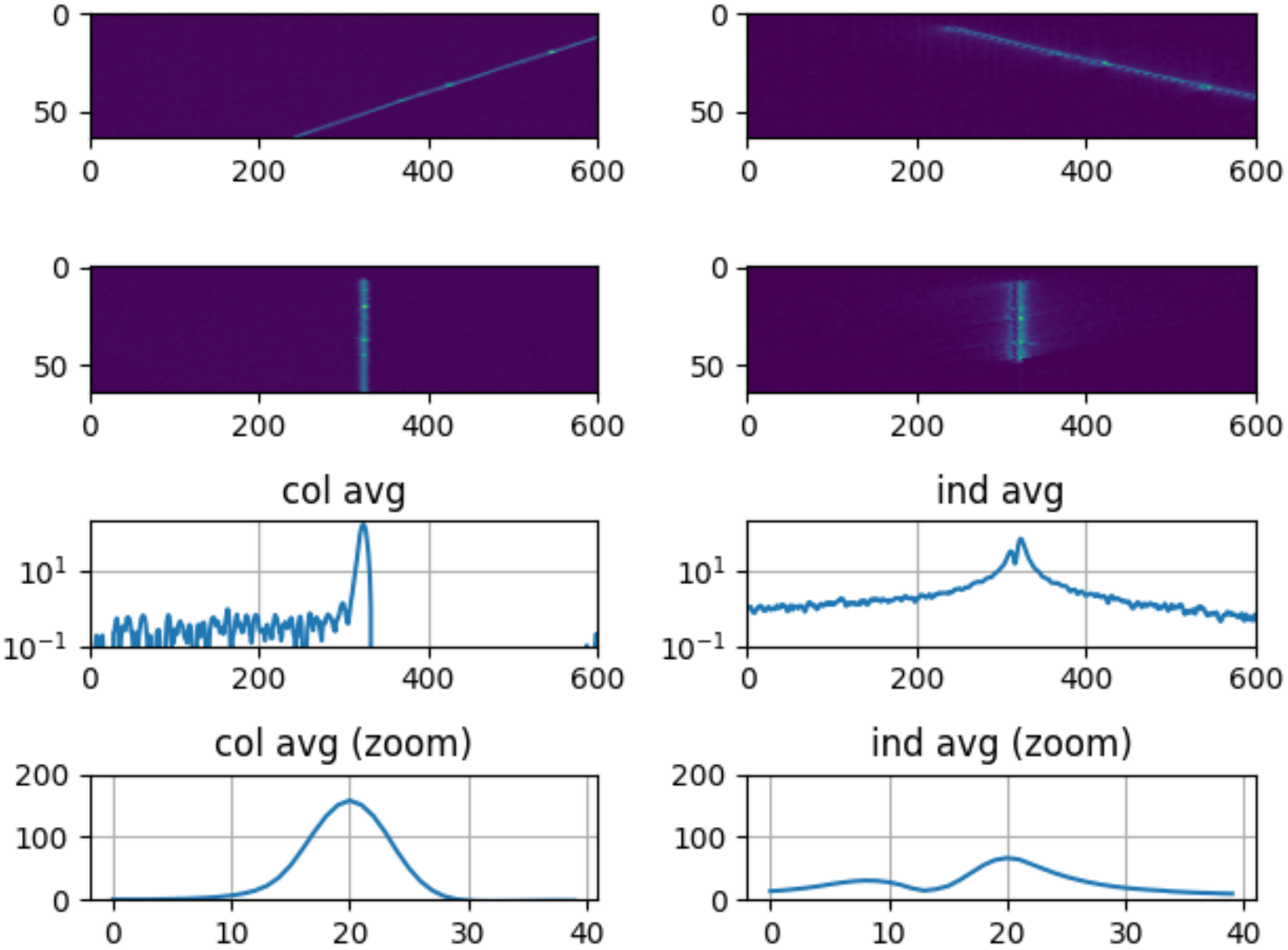
Average waveform - simulation



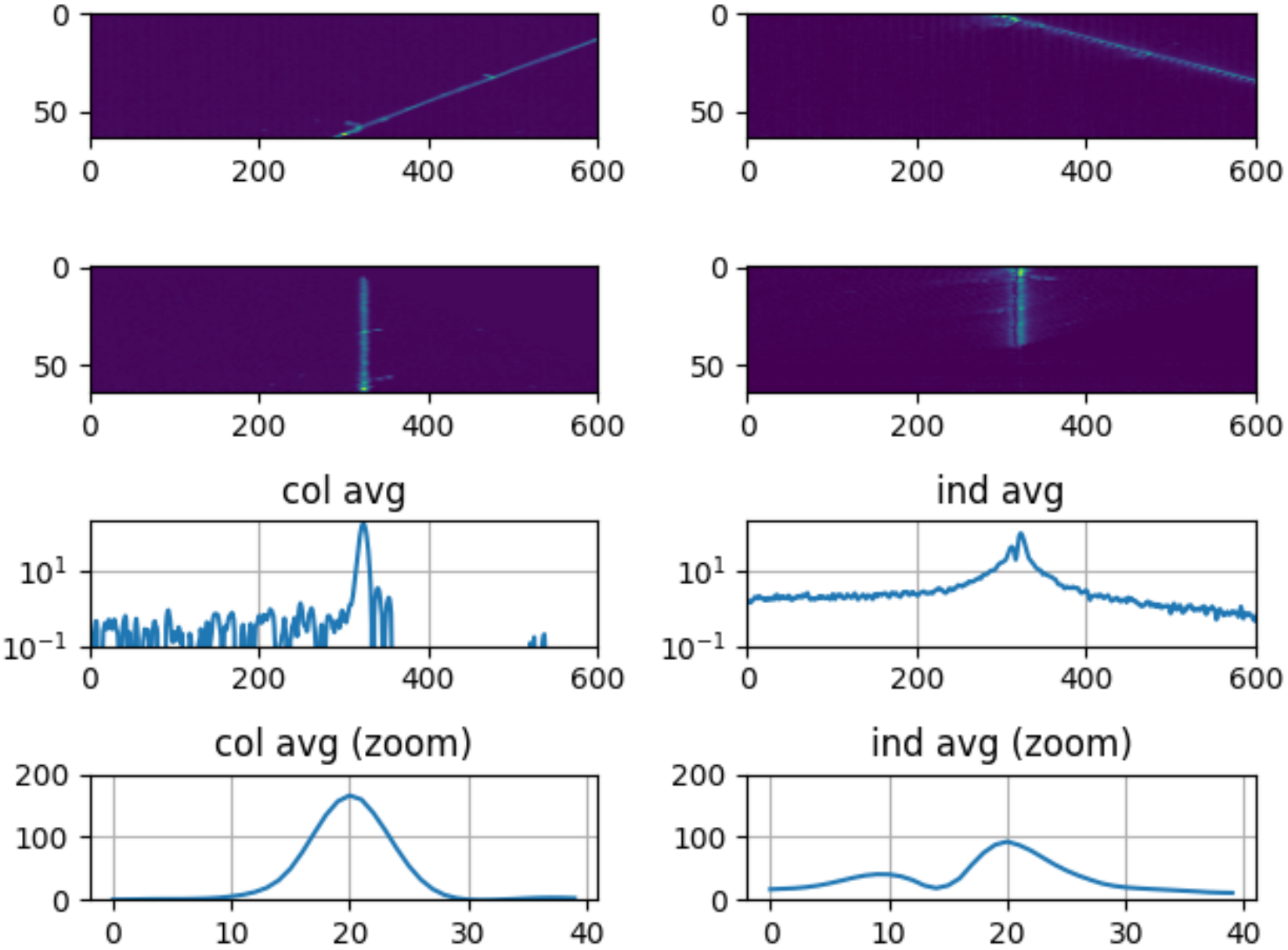
Average waveform - 159048336841-12



Average waveform - 159048364354-40



Average waveform - 159048405892-23



3-view reponses

Two 3-view responses

Both:

- isosceles hole pattern
- distance between the two PCB's: 10 mm
- PCB thichness: 3.2 mm

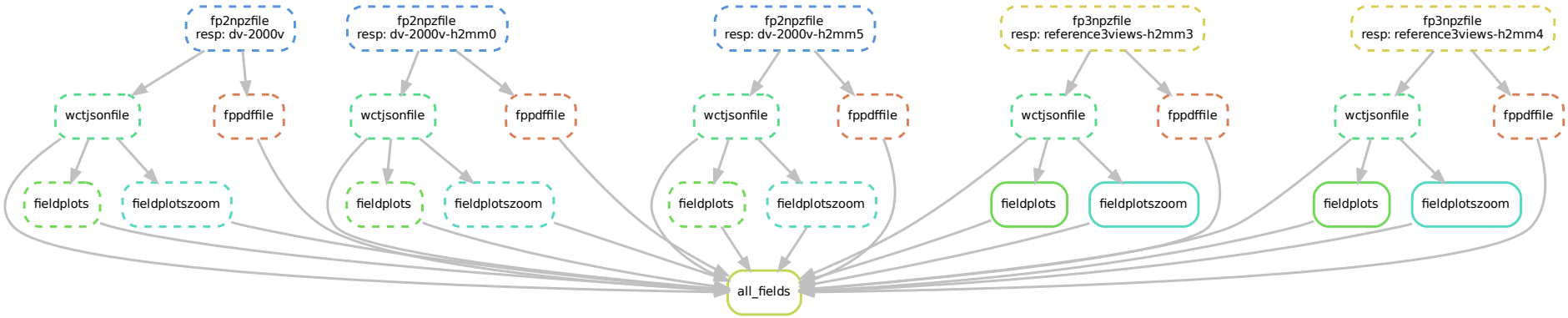
Smaller:

- mm hole diameter ~2.3mm
- hole spacing ~2.85mm
- collection strip pitch ~ 4.9 mm
- inductions strip pitch: ~7.35 mm

Larger:

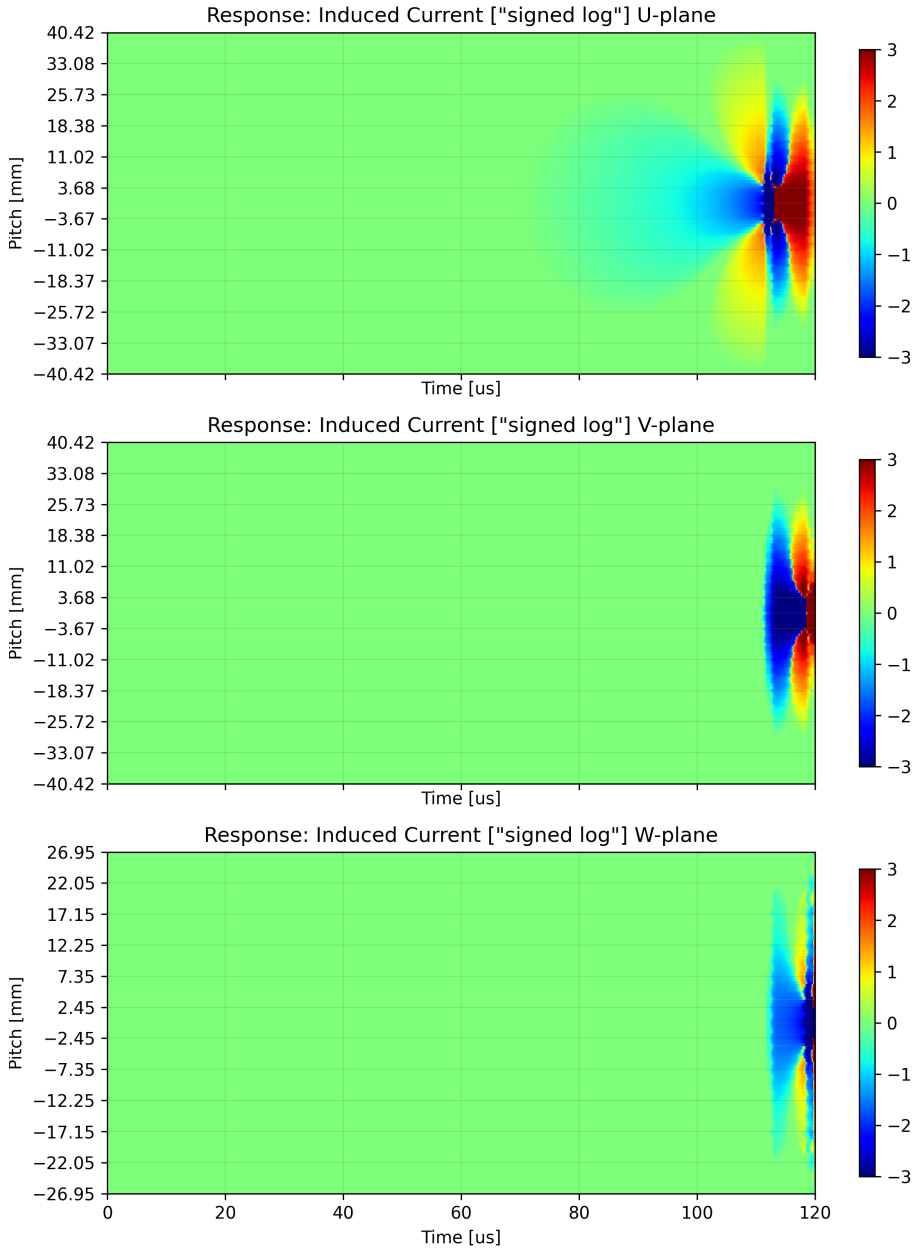
- hole diameter ~2.4mm
- hole spacing ~2.9mm
- collection strip pitch ~ 5.0 mm
- inductions strip pitch: ~7.5 mm

Import

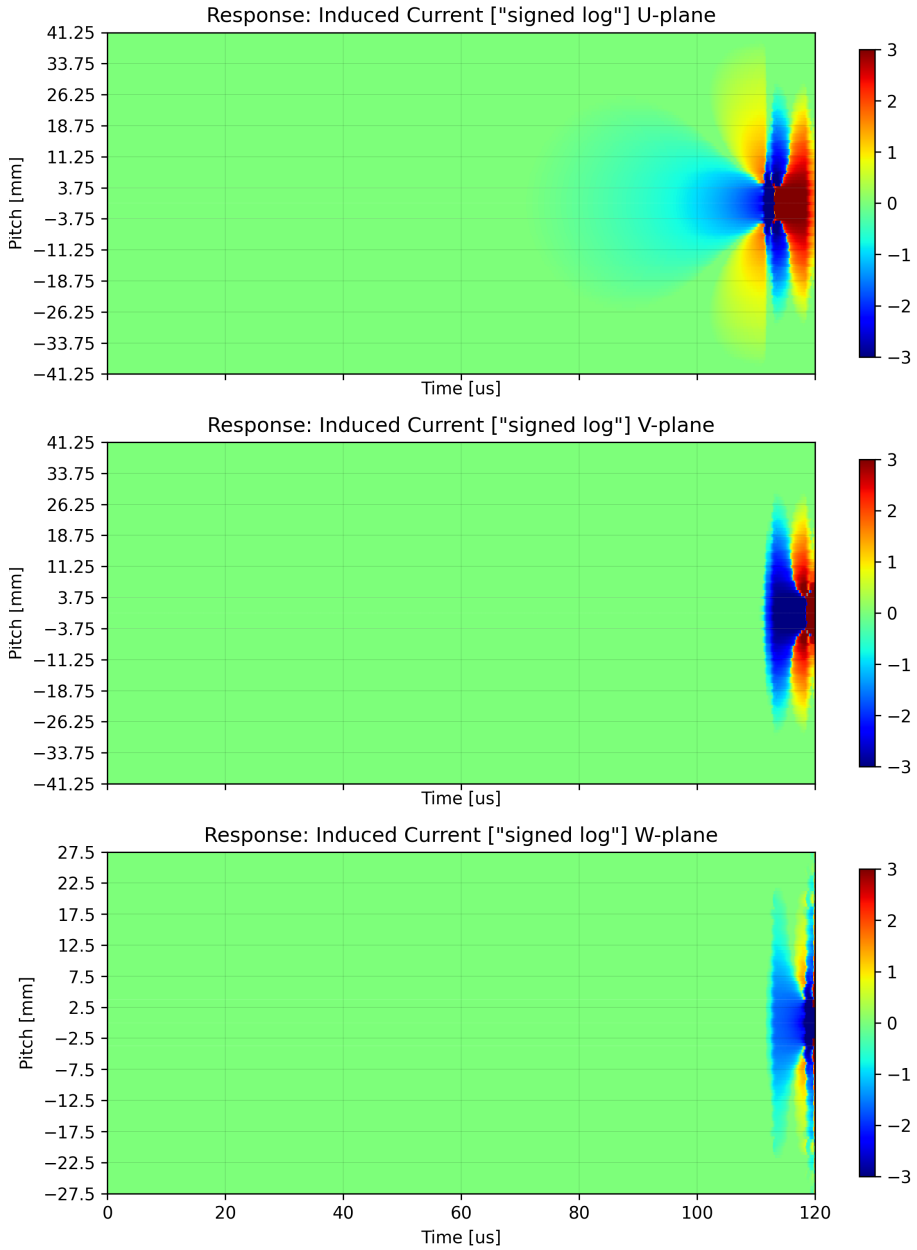


snakemake DAG for field import

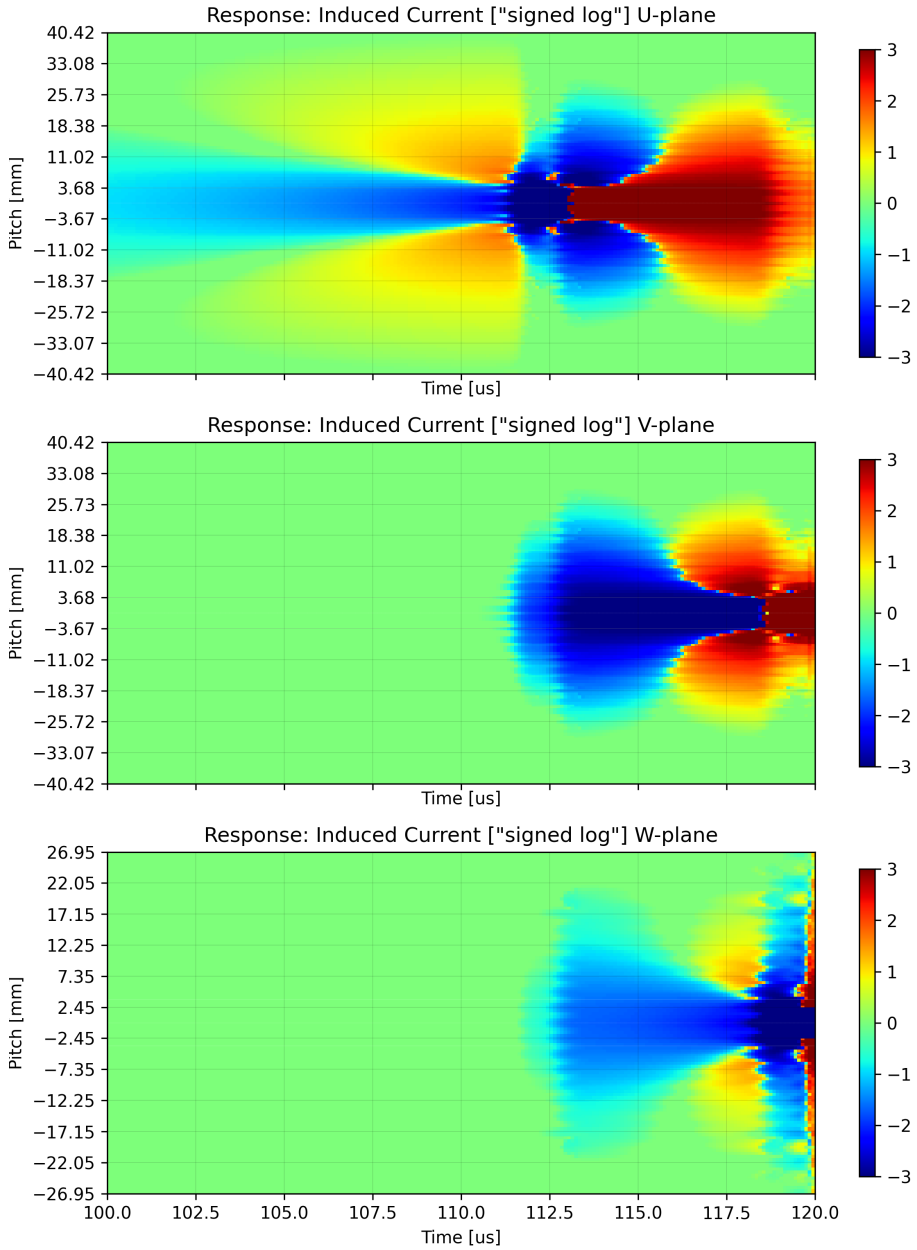
3-view response - 2.3mm hole



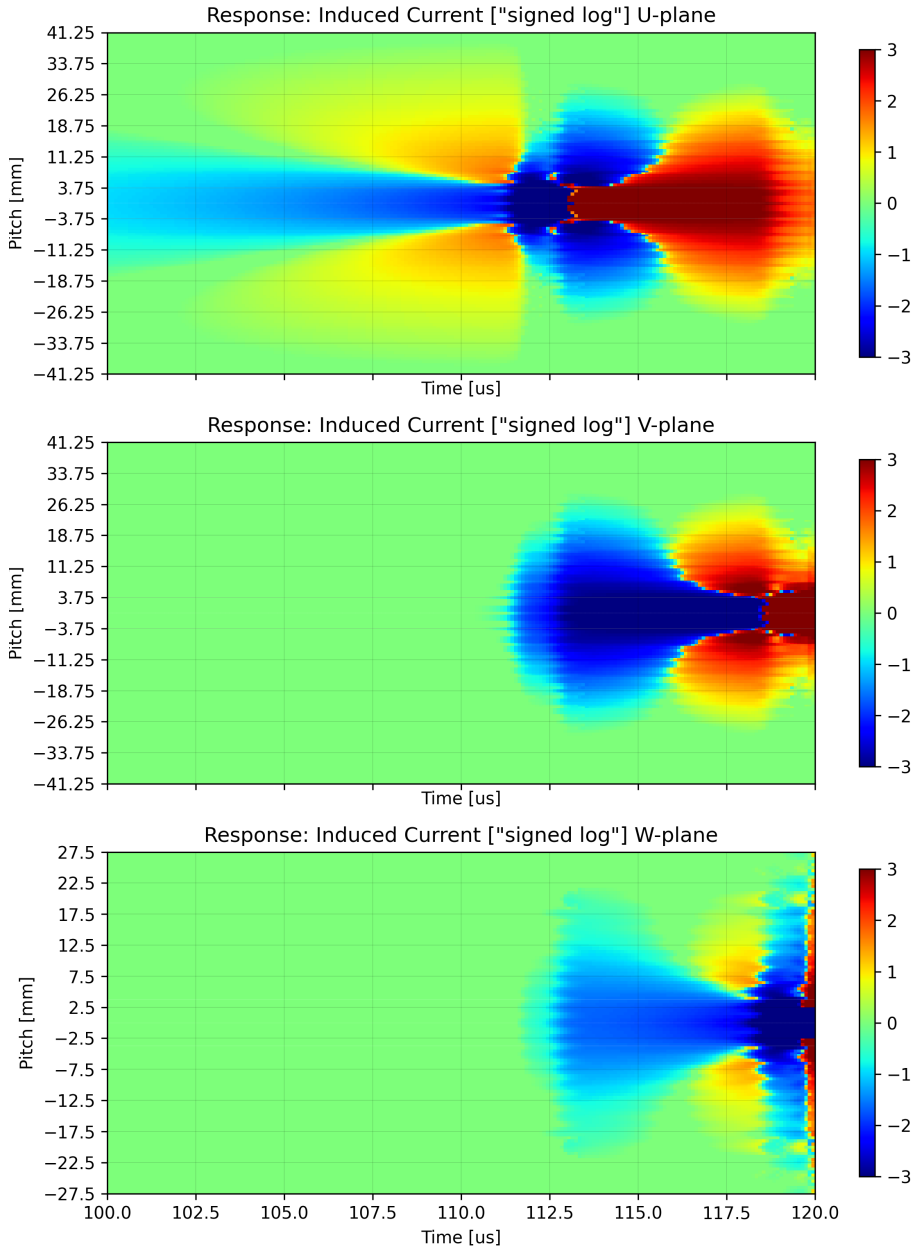
3-view response - 2.4mm hole



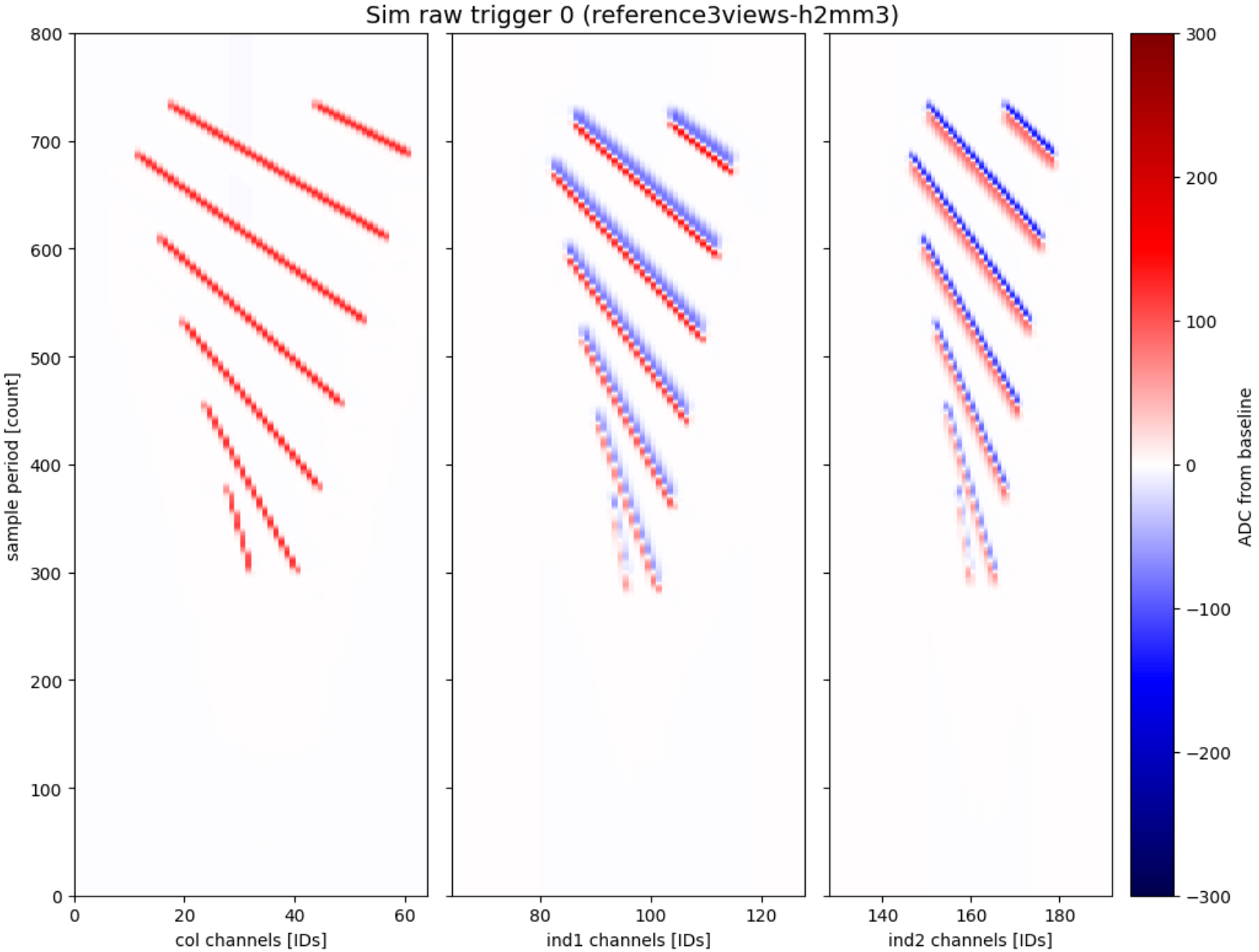
3-view response - 2.3mm hole - zoom



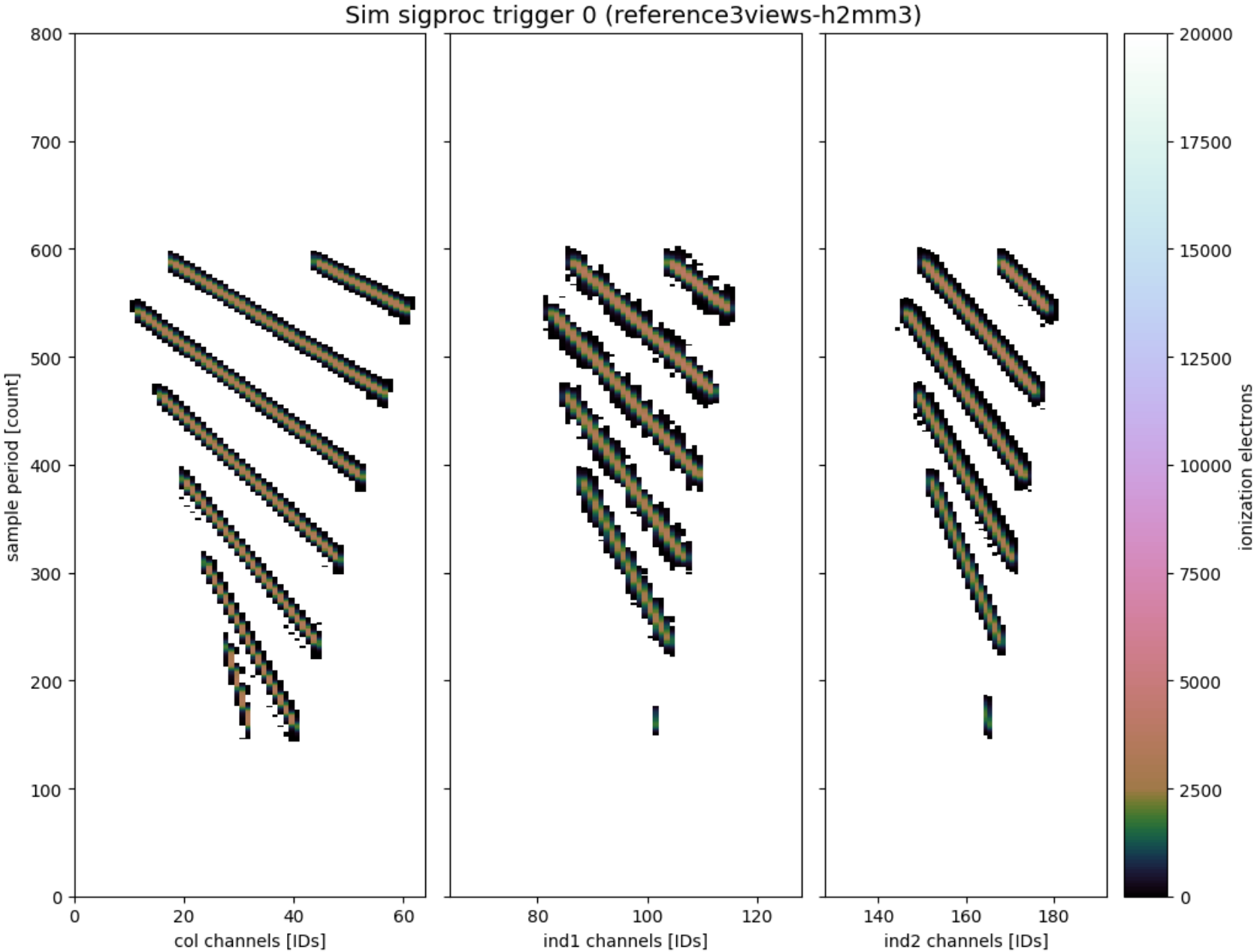
3-view response - 2.4mm hole - zoom



WCT Sim - 2.3mm hole



WCT Sim + SigProc - 2.3mm hole



Summary

2-view

- A check of "average waveform" for 50-L data and sim done
  - Simulation lacks noise.
- Sim uses Francesco's "3D $\rightarrow$ 2D" responses.
  - **Fairly good agreement for signal**
- Somewhat limited sample, larger sample will need work to automate.

3-view

- New 3-view, isosceles-hole pattern responses with 2.3mm and 2.4mm
- 2.4mm trips some bug in `ImpactTransform` under investigation