More on signal generation

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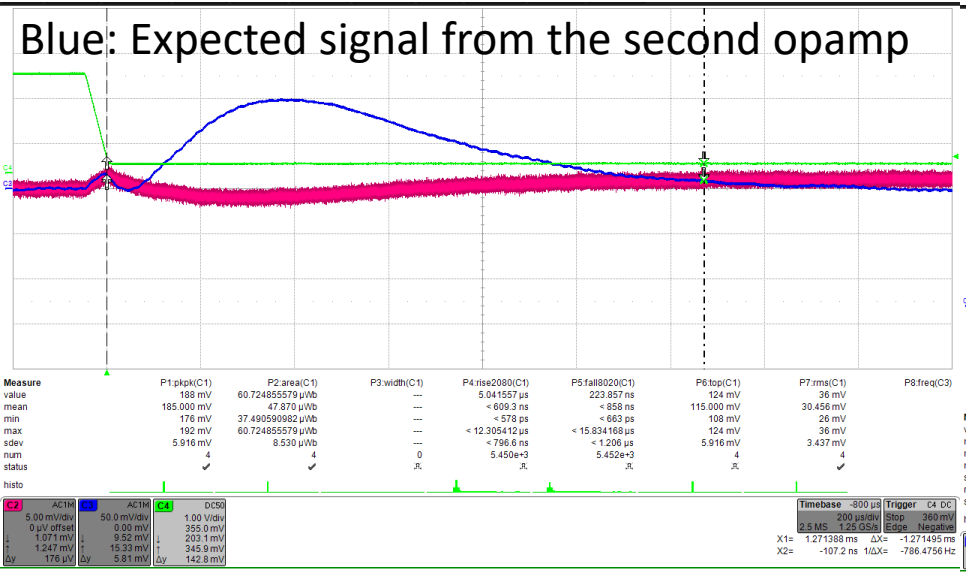
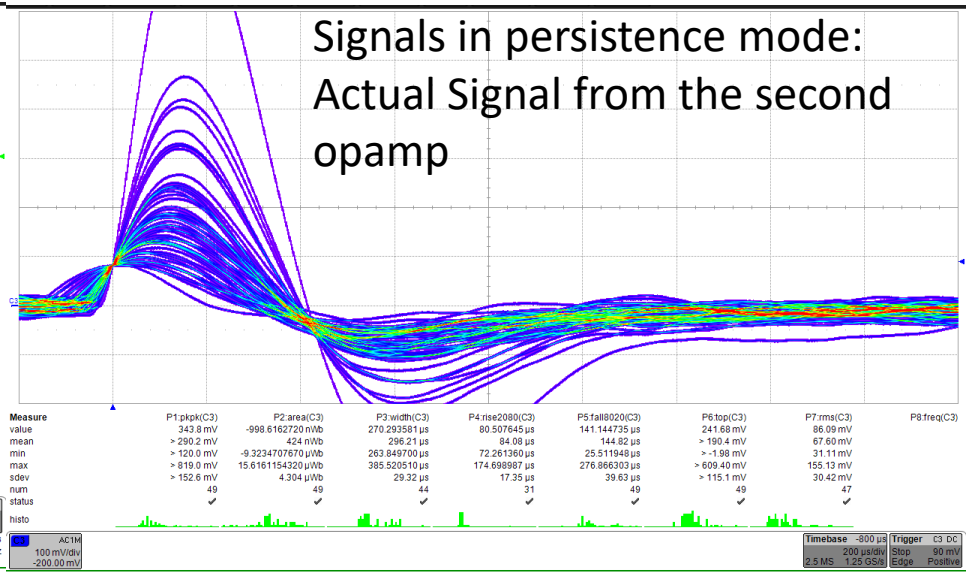
Generating test signals



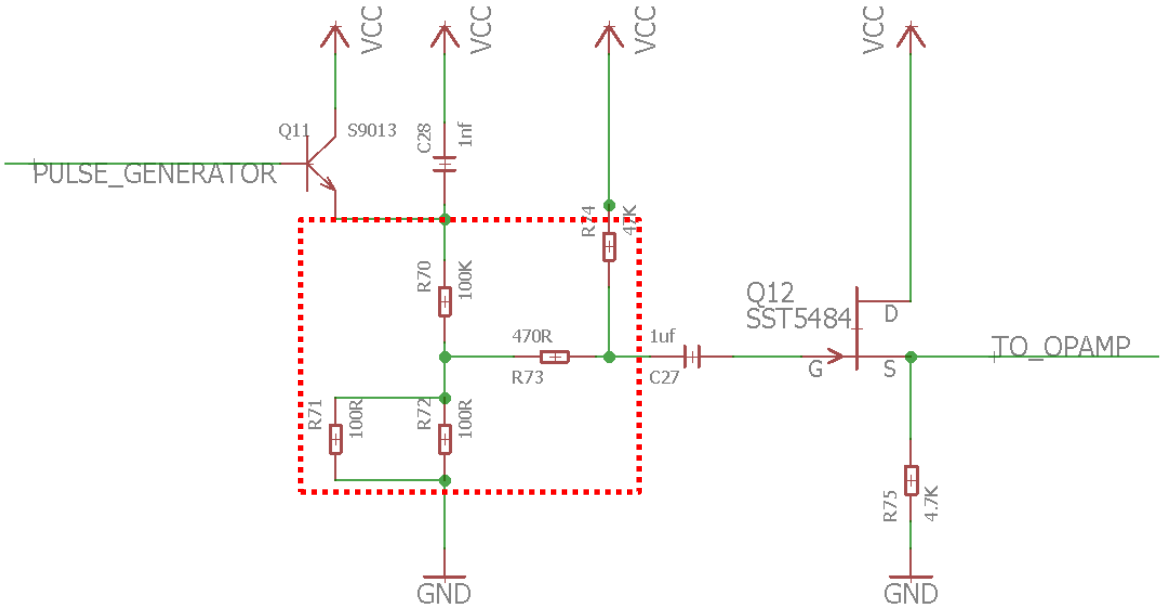


- Behaves as predicted by Michaels simulation
- Notable artefact at the front of the signal
- Long pulse
- Low undershoot

- Short pulse
- Very strong undershoot

=> PIN-Diode behaves significantly different than modeled

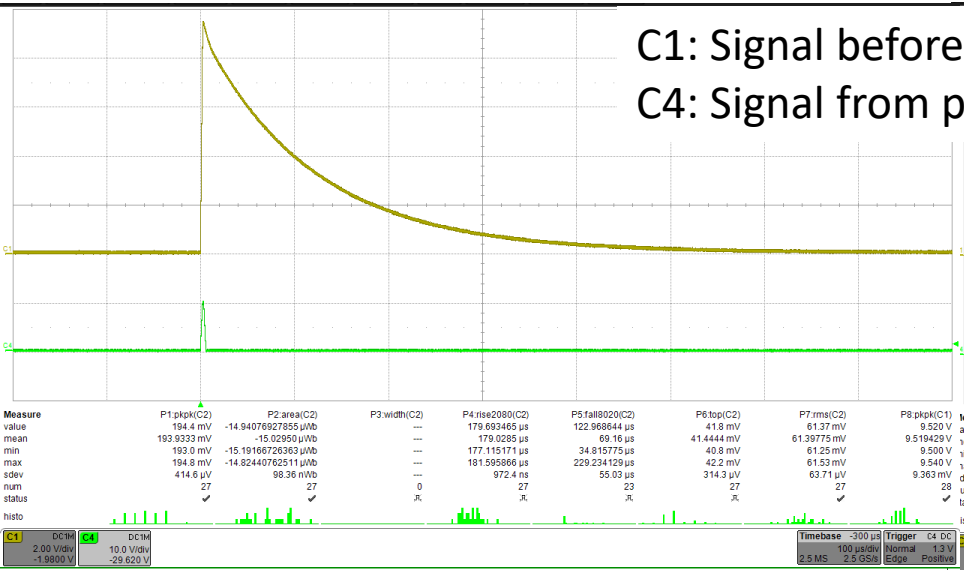
Generating test signals

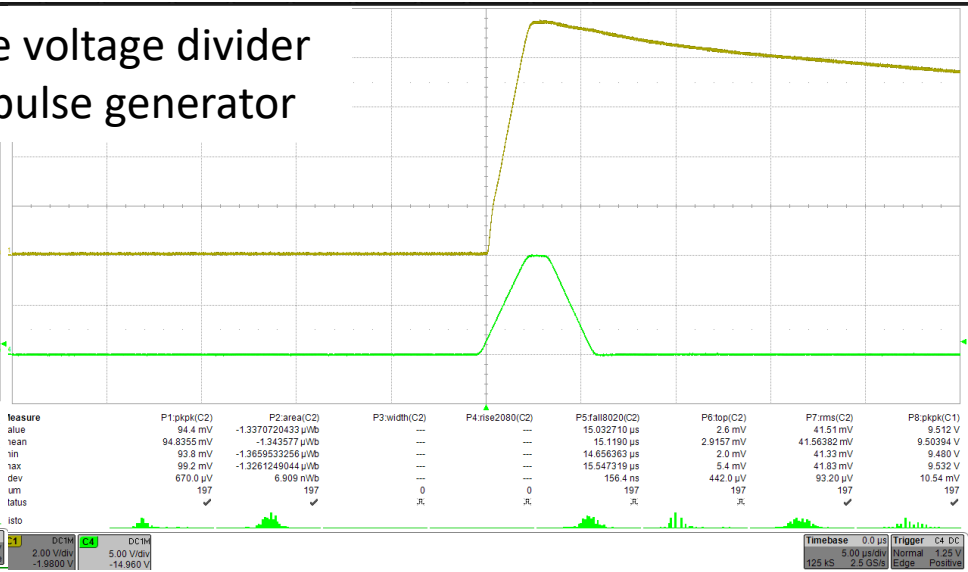


Revised signal generation circuit

- Setup needed to be inverted
- Pulse-generator now outputs short pulses
- Resulting signal: Sharp rising edge, followed by an exponential decay
- Most of the setup could be left untouched
- Signal height at the JFET can be controlled by changing the voltage of the HIGH state of the pulse generator (input to NPN transistor gate)

Generating test signals

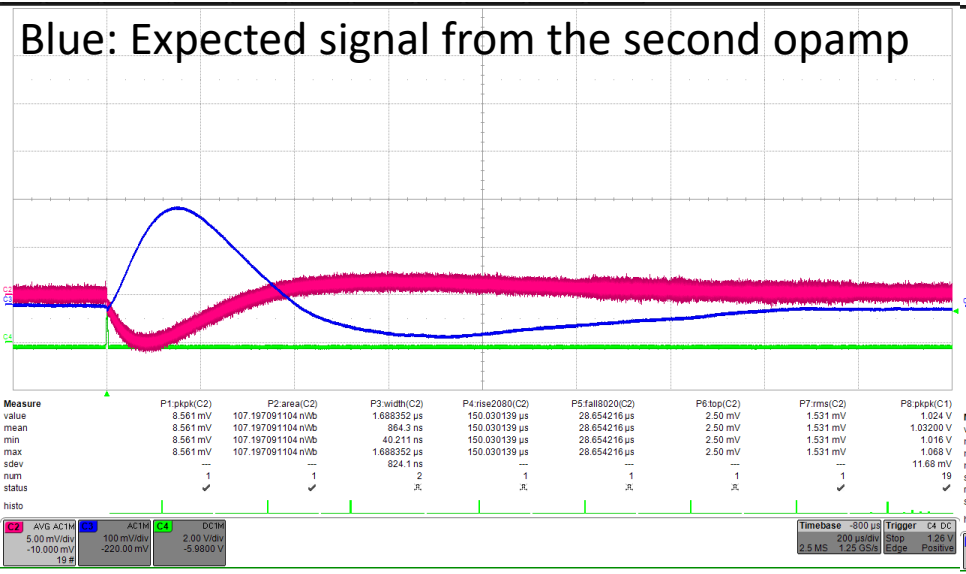


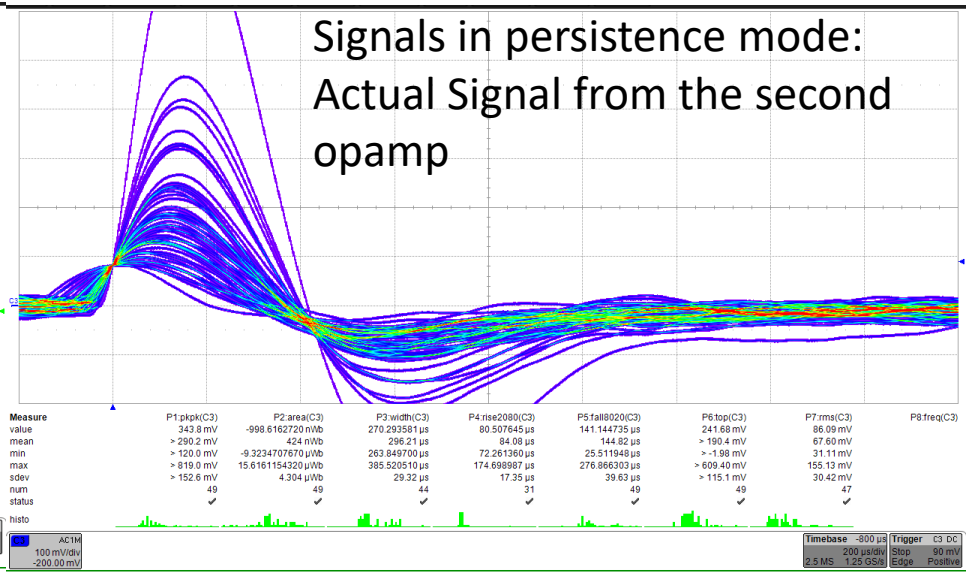


- Timebase: 100 us / div
- Sharp peak (2 us)
- Exponential decay with configurable time constant

- Timebase: 5 us / div
- No sharper edges possible from the pulse generator, due to noise coupling into the rest of the circuit

Generating test signals

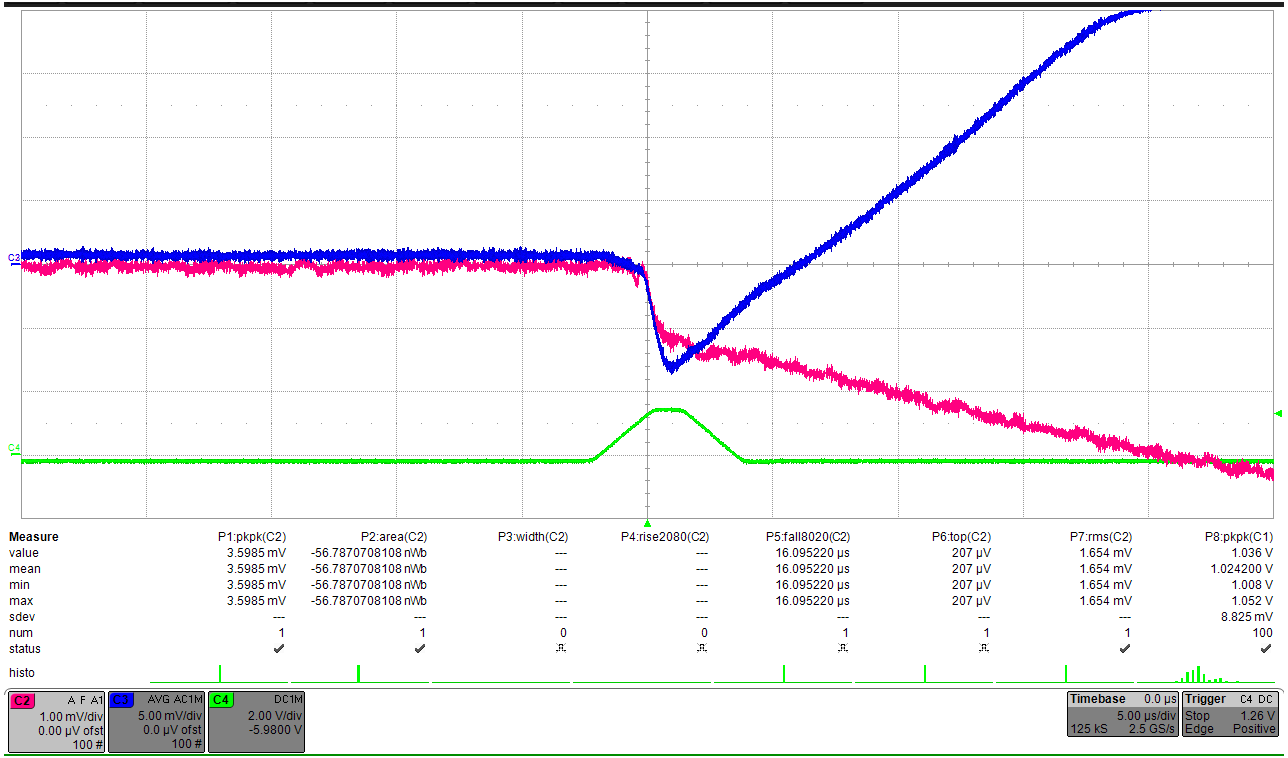




- Expected pulse shapes are now visible
- Small artefacts can be seen at the beginning of the peak
- Input to the JFET was scaled by reducing input to the NPN transistor gate

- Signal for comparison

Generating test signals: Artefacts



- Signals
  - C1: First opamp
  - C2: Second opamp
  - C4: Pulse generator
- Artefacts appear at the rising edge of the pulse generator
- Unfortunately decreasing and increasing the risetime introduces new artifacts
- Artifacts scale with pulse height
- Note: Post-processing was applied to signals

Next steps

- Experiment:
  - Getting Michaels opamp-simulation to run on the cluster
  - Finalize dimensioning of the op-amps
    - Compare analytical simulation and results with the pulse generator
  - Start with building the schematics for the V2 board
  - Write a program to read out all signals from the oscilloscope on trigger
  - Coincidence measurements with the CosMo-detector
- Thesis:
  - Finishing the first revision on the findings concerning the angular distribution of cosmic muons