

TRB/DiRICH measurements and the ToT structure

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PHYSICS

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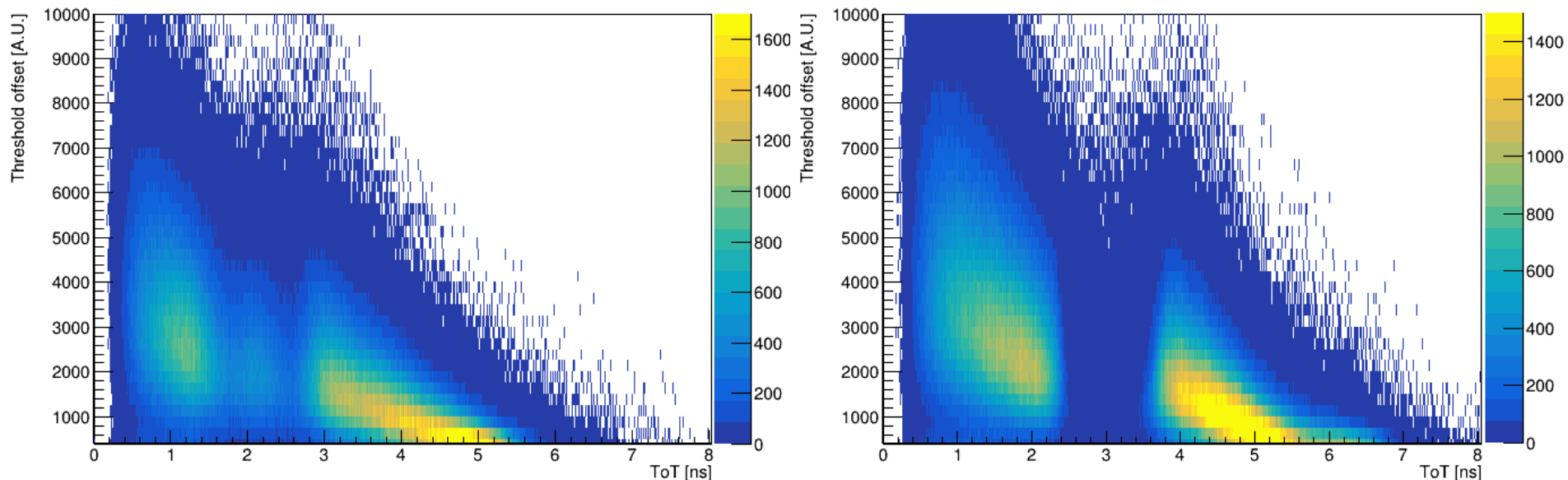
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TRB/DiRICH DAQ - Multiple peaks in TOT spectra

- Current state: at least 2 peaks in the tot spectra, seen at MCP-PMTs of all vendors
- 10pF instead of 1pF at input filtering provides cleaner ToT measurement

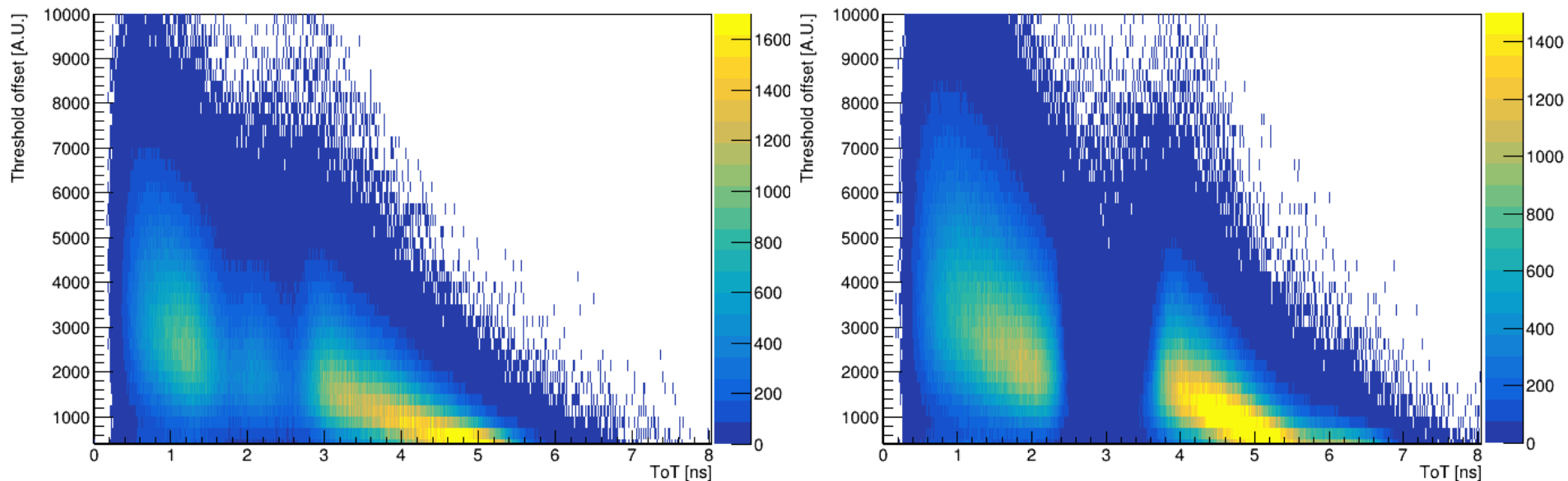
Pixel x4 y5 Photek A1200107, DiRICH Pixel x4 y5 10pF



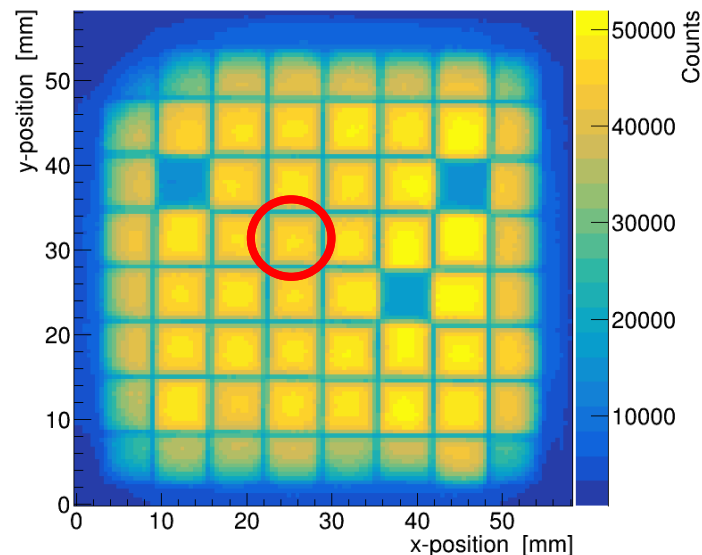
TRB/DiRICH DAQ - Multiple peaks in TOT spectra

- Source in DAQ or MCP-PMTs?
- Not seen when using pulsers
- High pixel tubes are less affected

Pixel x4 y5 Photek A1200107, DiRICH Pixel x4 y5 10pF



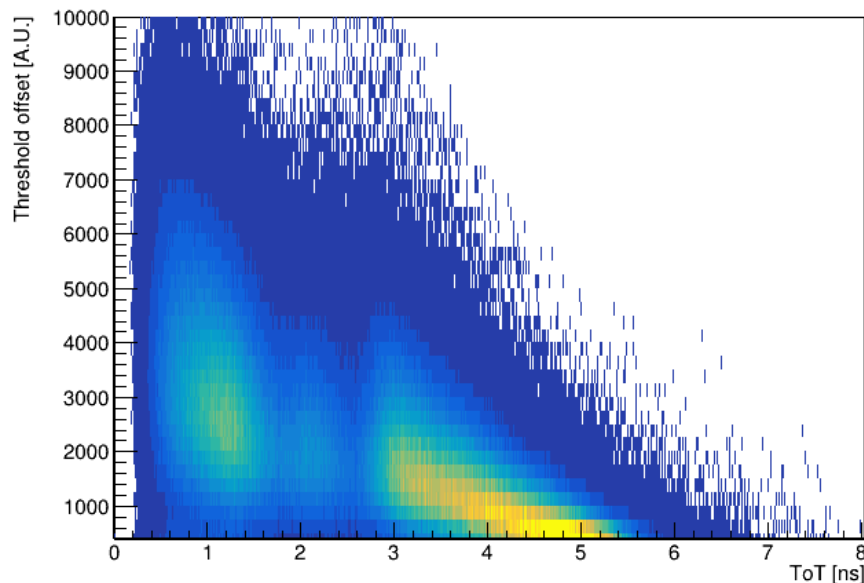
x-pos vs y-pos (with laser time cut, 1 hit) A1200107



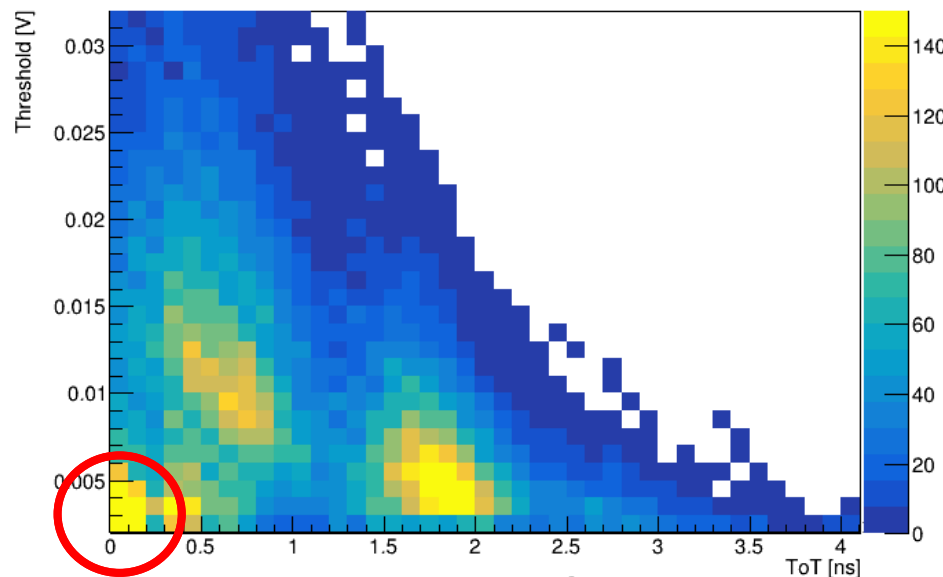
TRB/DiRICH DAQ - Multiple peaks

- Capturing waveforms with the oscilloscope and measure the ToT (time difference between first and last transition)
- Multiple peaks also in oscilloscope spectra, source is not the DAQ, but the MCP-PMTs. Produced by backscattered electrons?

Pixel x4 y5



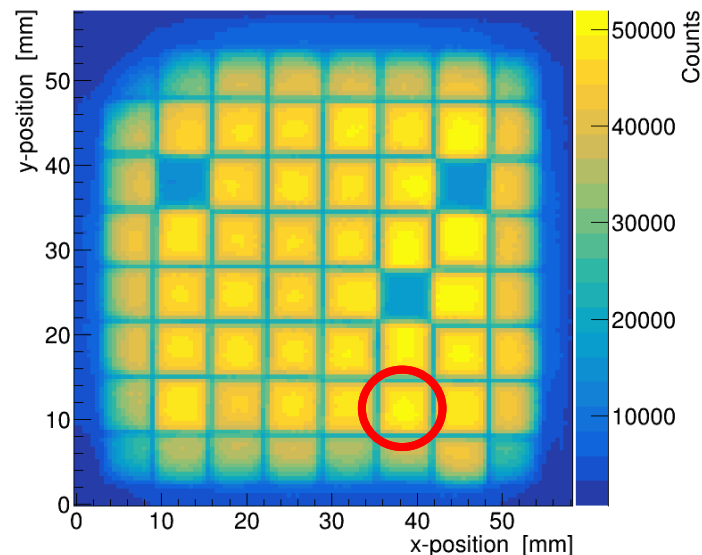
Photek A1200107, DiRICH



Sampling noise

Oscilloscope

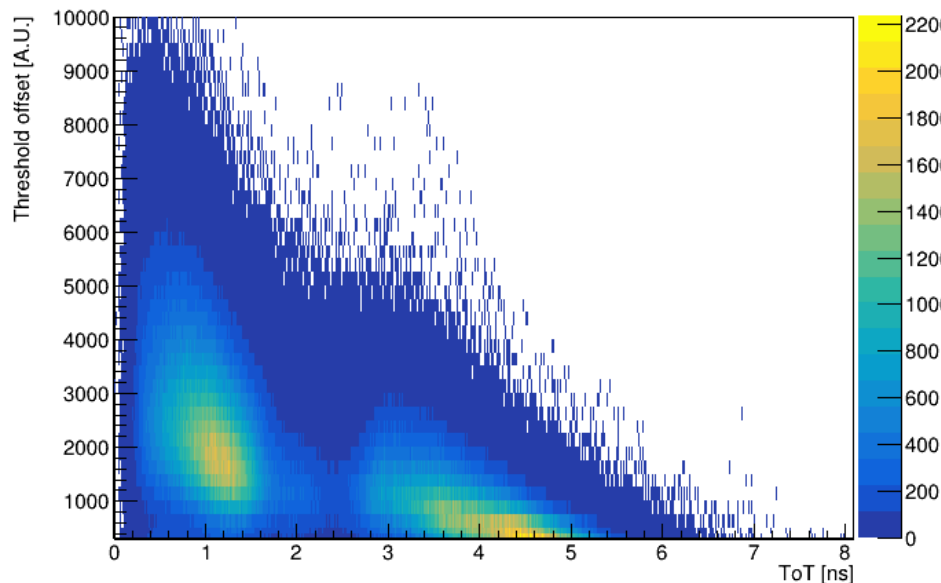
x-pos vs y-pos (with laser time cut, 1 hit) A1200107



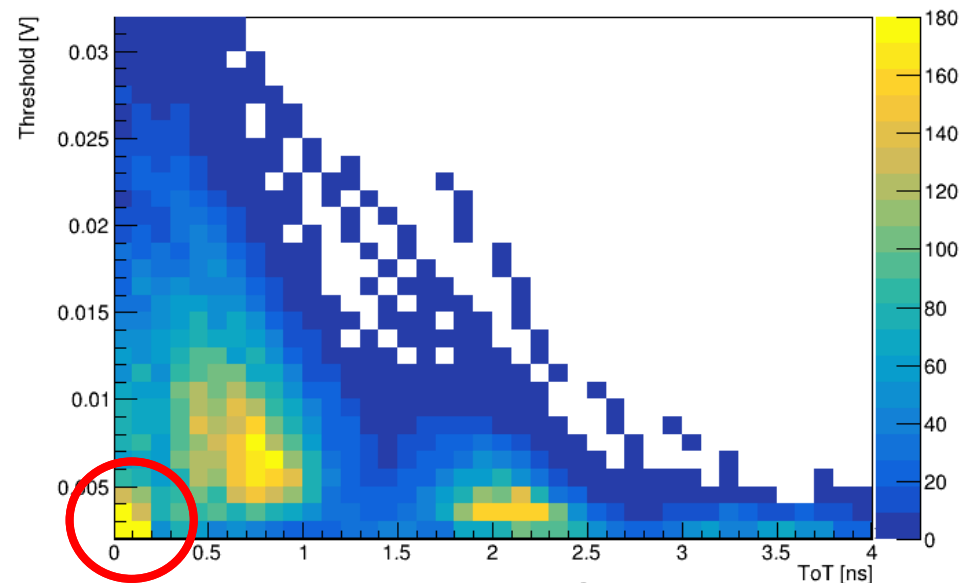
TRB/DiRICH DAQ - Multiple peaks

- Capturing waveforms with the oscilloscope and measure the ToT (time difference between first and last transition)
- Multiple peaks also in oscilloscope spectra, source is not the DAQ, but the MCP-PMTs. Produced by backscattered electrons?

Pixel x6 y2



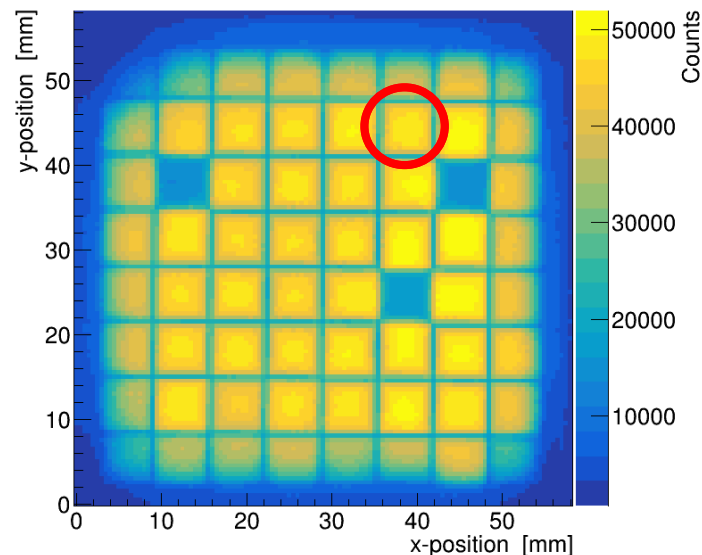
Photek A1200107, DiRICH



Sampling noise

Oscilloscope

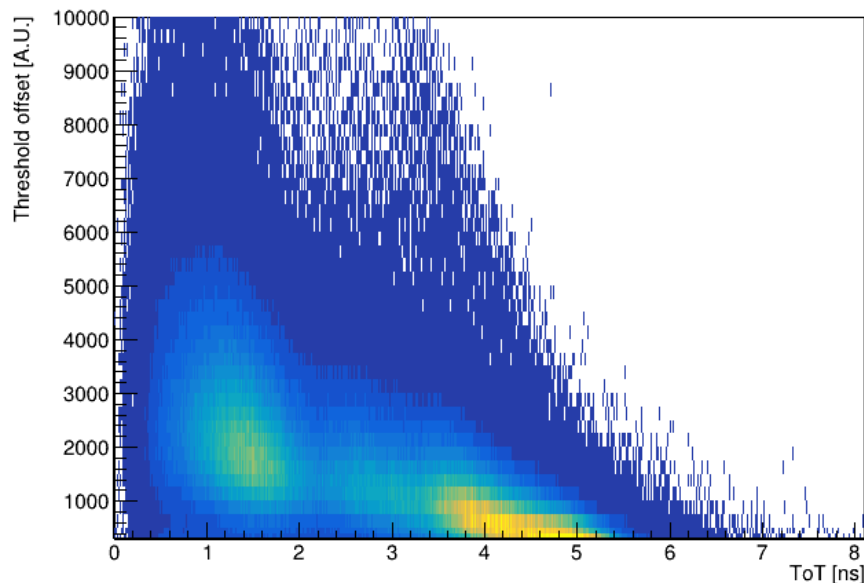
x-pos vs y-pos (with laser time cut, 1 hit) A1200107



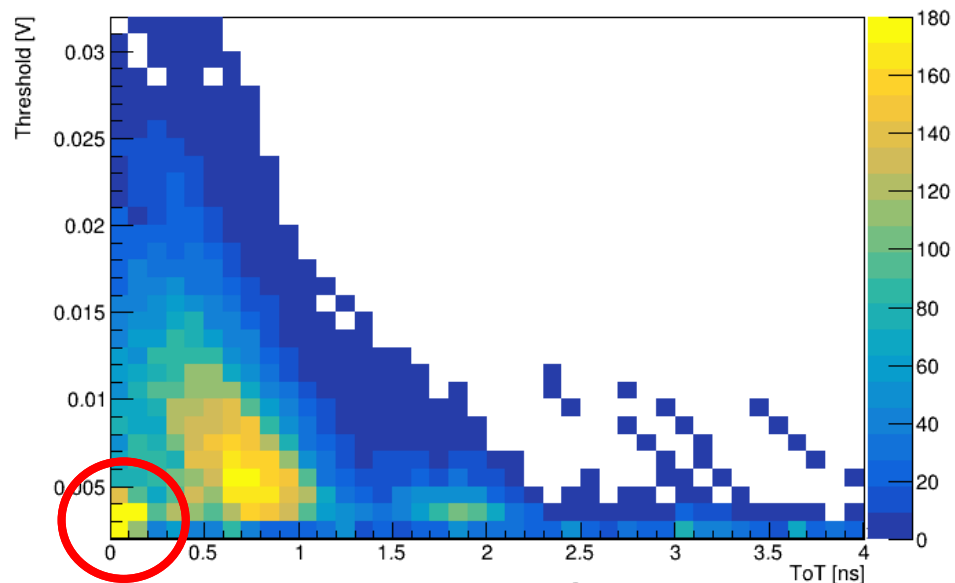
TRB/DiRICH DAQ - Multiple peaks

- Capturing waveforms with the oscilloscope and measure the ToT (time difference between first and last transition)
- Multiple peaks also in oscilloscope spectra, source is not the DAQ, but the MCP-PMTs. Produced by backscattered electrons?

Pixel x6 y7



Photek A1200107, DiRICH

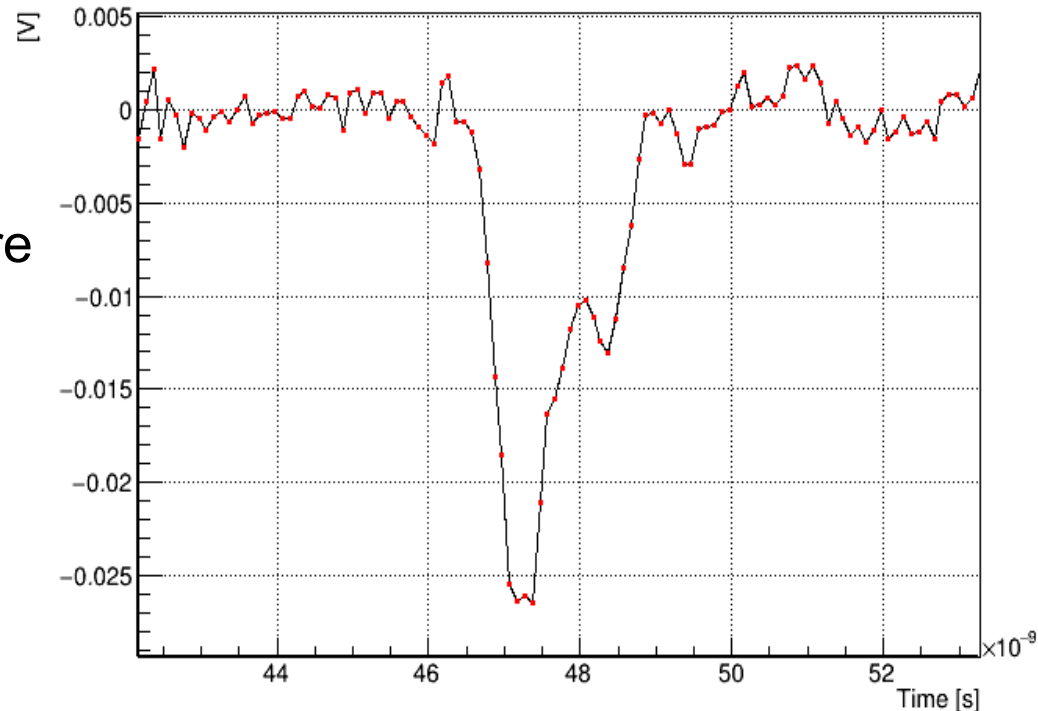


Sampling noise

Oscilloscope

TRB/DiRICH DAQ - Multiple peaks in TOT spectra

- ToT for charge estimation clearly not the best solution
- Not solvable with current hardware
- Timewalk correction still possible
- Test whether structure is produced by backscattered electrons by increasing the voltage between Cathode and MCP-In
- If structure shrinks the cause are backscattered electrons



Outlook

- Multiple peaks in ToT spectra caused by MCP-PMTs
- Not solvable with current hardware, but timewalk correction is possible
- Record Photonis and Hamamatsu waveforms to compare ToT
- Increase voltage between Cathode and MCP-In to test if structure shrinks

- Current problems:
 - DiRICH Concentrator does not accept external clock, should improve measured time precision
 - Operate TRB boards in linear mode, should improve measured time precision but have to provide 4 individual voltages

- Test different capacitor/resistor values at input stage of the DiRICH