The first order estimation of TTS of an LAPPD using a fast oscilloscope

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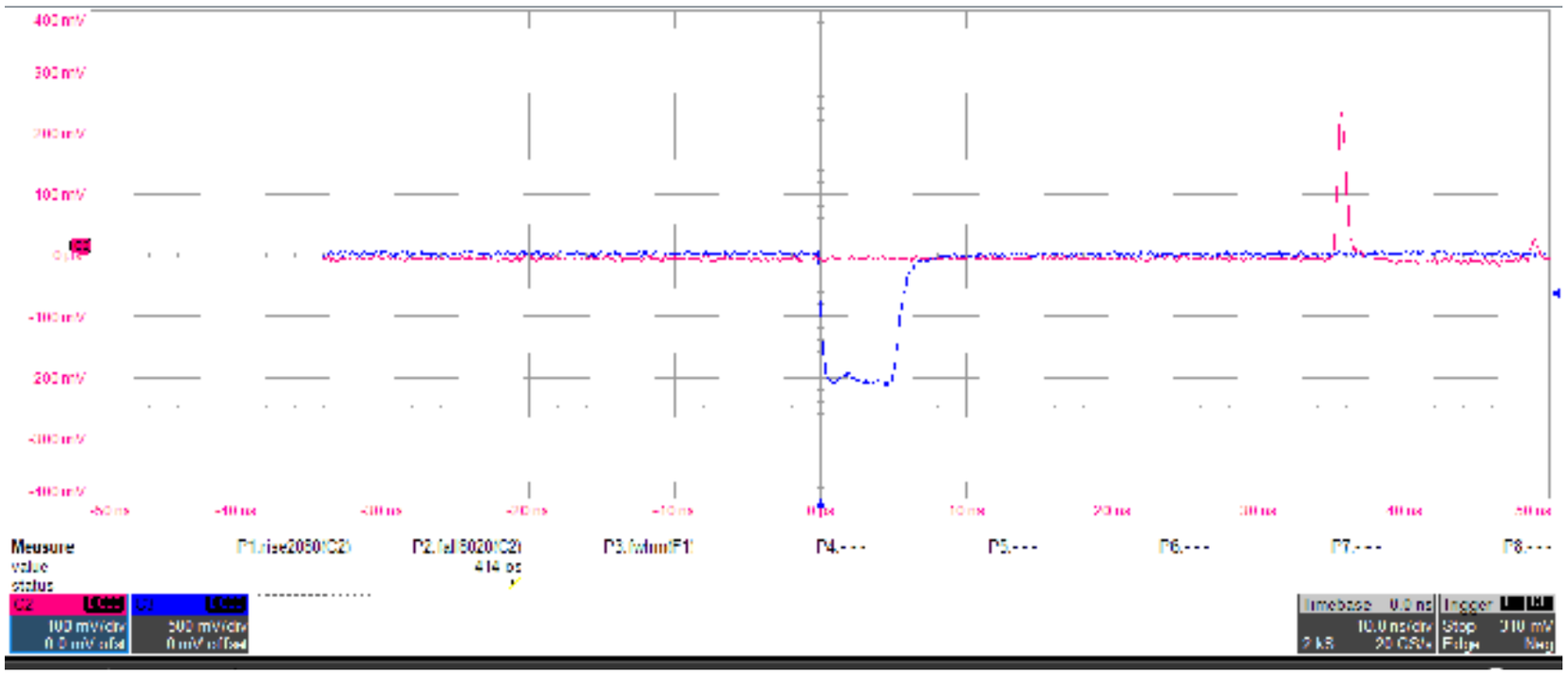
We have a fast oscilloscope

- Bandwidth 2.5 GH
- Max sampling rate = 20 GS/s



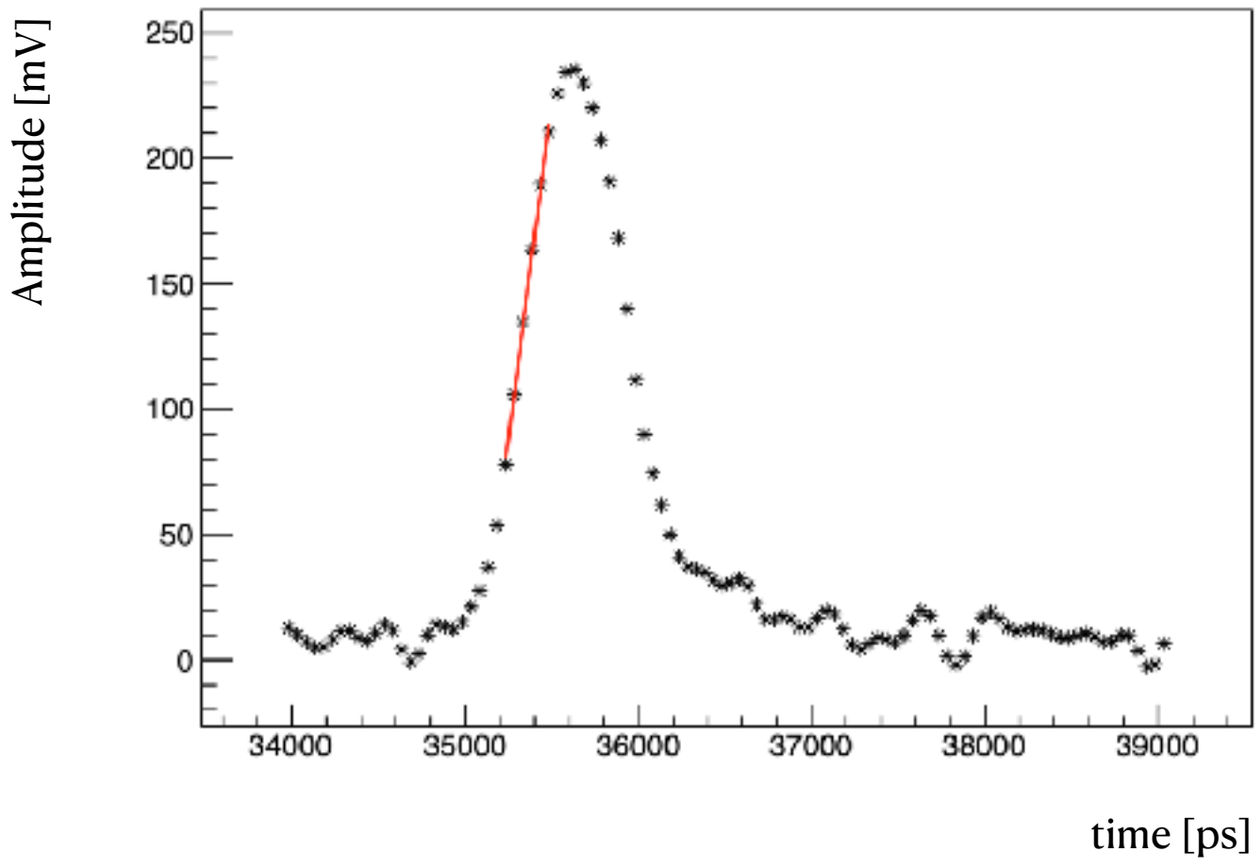
- LASER 405 nm,
- 21 ps (sigma),
- Focused on Ch11 (<500 µm spot size)
- Amplifier (2 GHz, 20 dB)

- LAPPD # 153
- Working voltage: PC/850/200/850/200

- The oscilloscope triggered on the Sync Out of the LASER
- LAPPD signal goes to another channel (50 ps sample width)

- The uncertainty on the arrival time of the signal (at 50%) is calculated

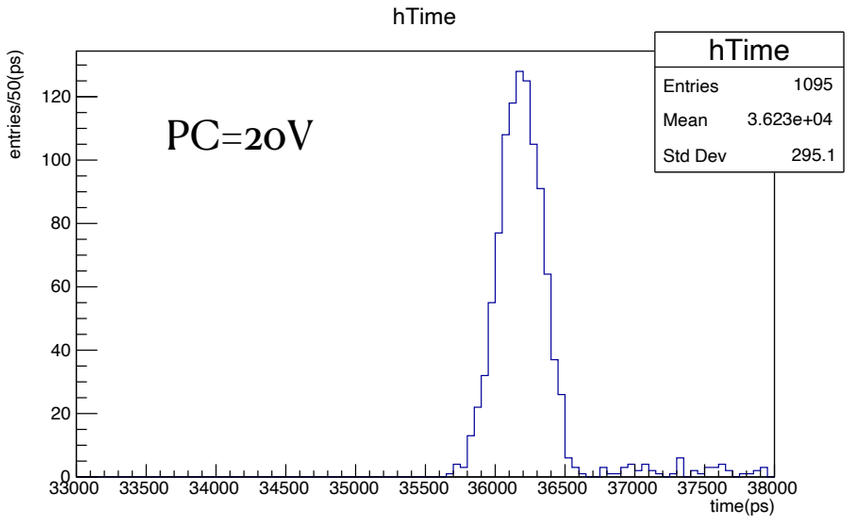
Arrival time from the signal:

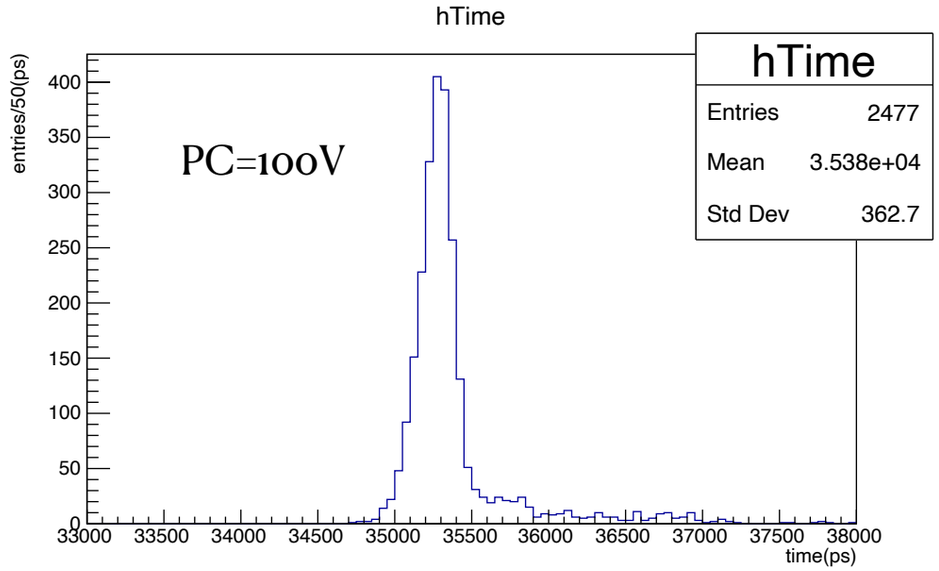


- The ‘sample window’ records data ~34-39 ns.
- Photon events are selected above a threshold, within 5 ns time window.
- Single PhotoElectron are assured: 97-99% empty triggers.
- After the peak selection, the leading edge (25-85%) of the signal is fitted with a linear function.
- The time at 50% amplitude is calculated from the fit.

Distribution of the Transit Time

Folded with uncertainty from: LASER, Electronics





Measurements by Incom on LAPPD #153

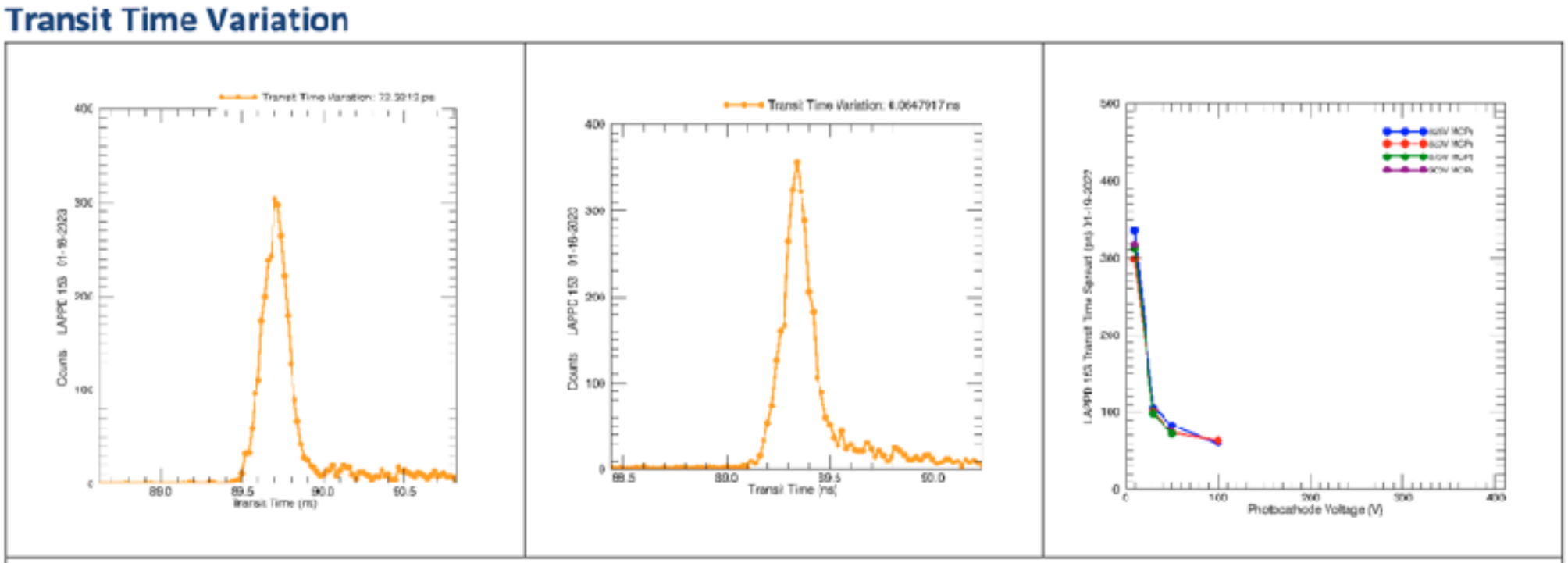
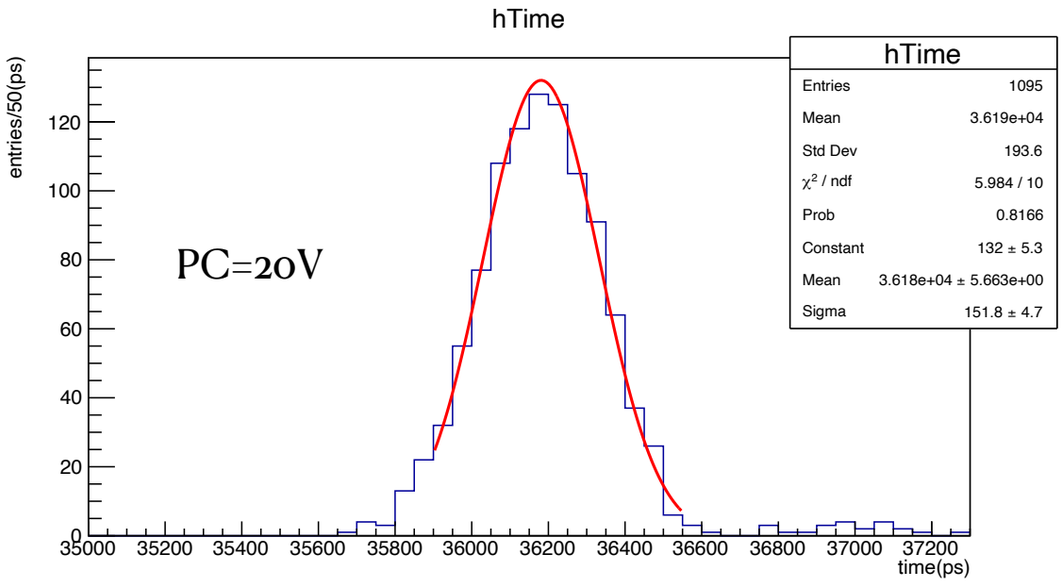
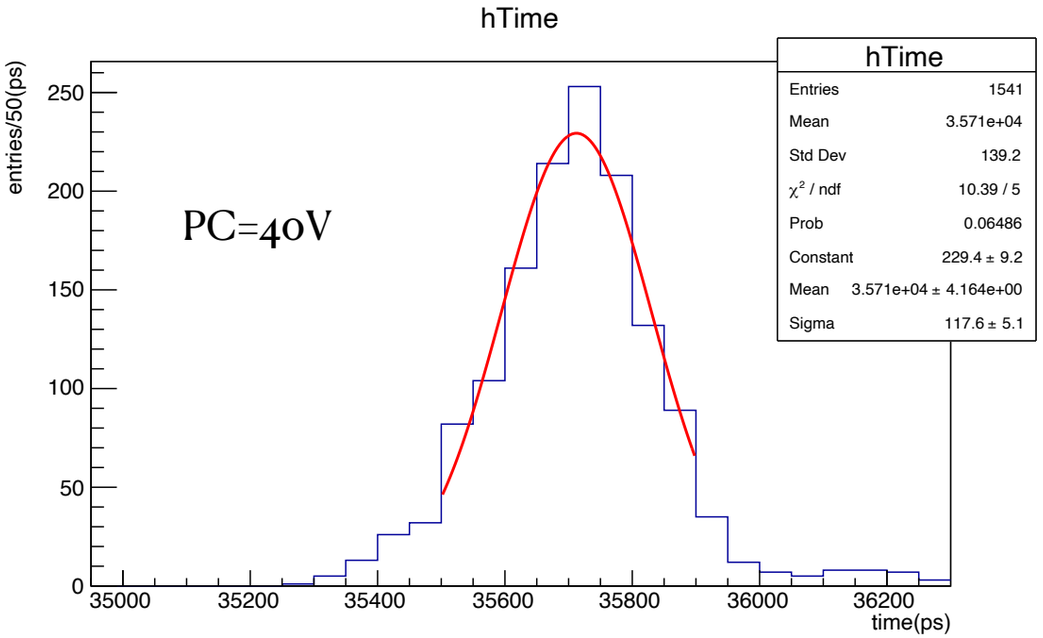
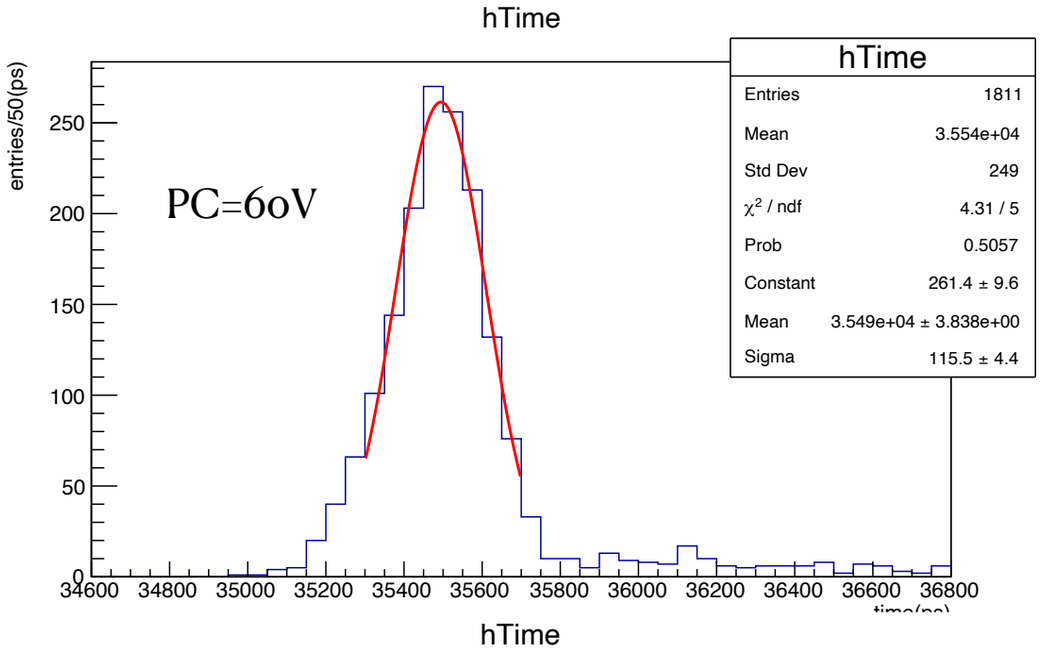
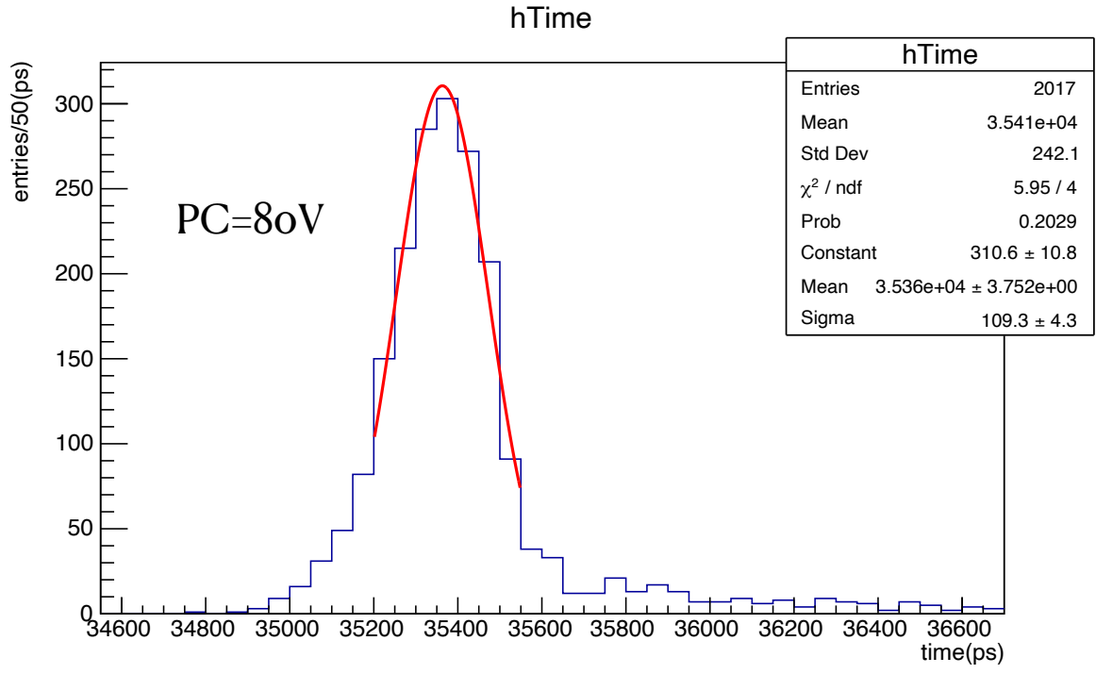


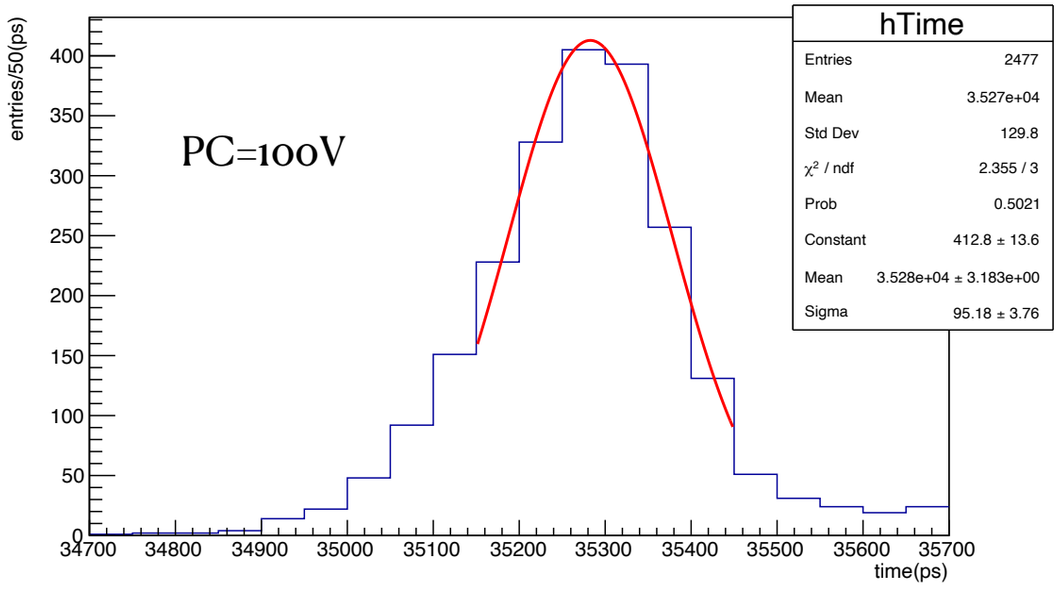
Figure 13. Left: The transit time variation is shown for 875 V/MCP and 50 V on the photocathode. This is the time difference between the observed laser firing and the arrival of the MCP pulse at the end of the pixel-transformer chain. **Center:** The transit time variation is shown for 825 V/MCP and 100 V on the photocathode. This is the time difference between the observed laser firing and the arrival of the MCP pulse at the end of the pixel-transformer chain. **Right**: The transit time variation is shown as a function of photocathode voltage for different MCP voltages.





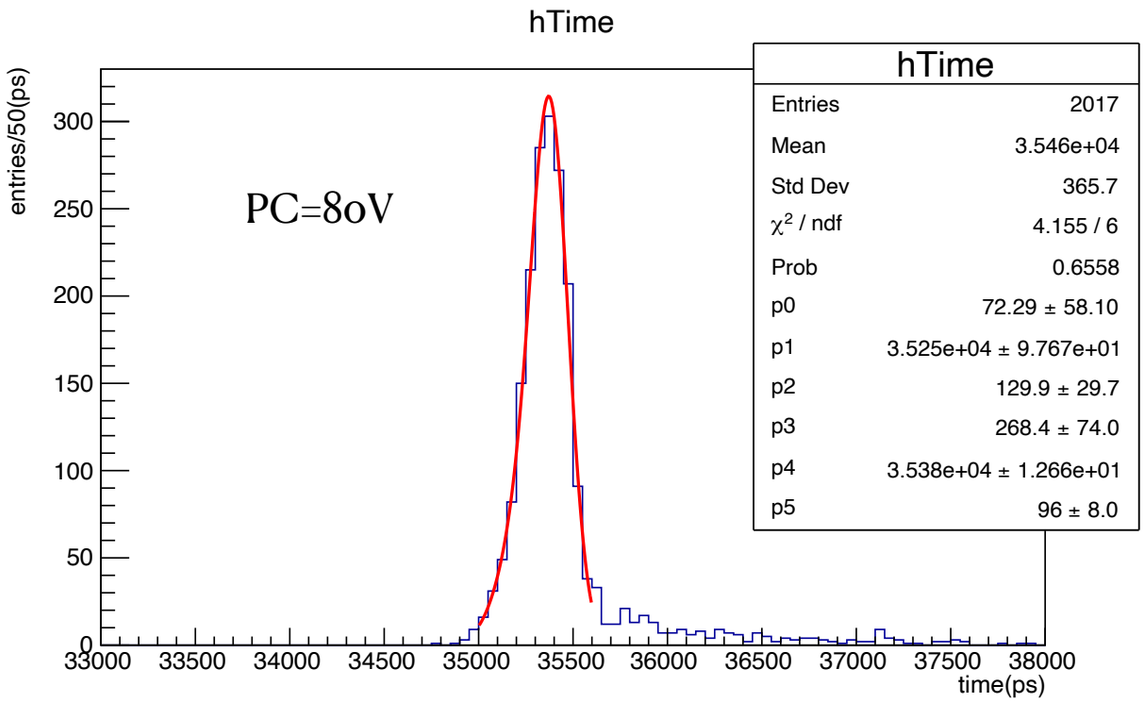




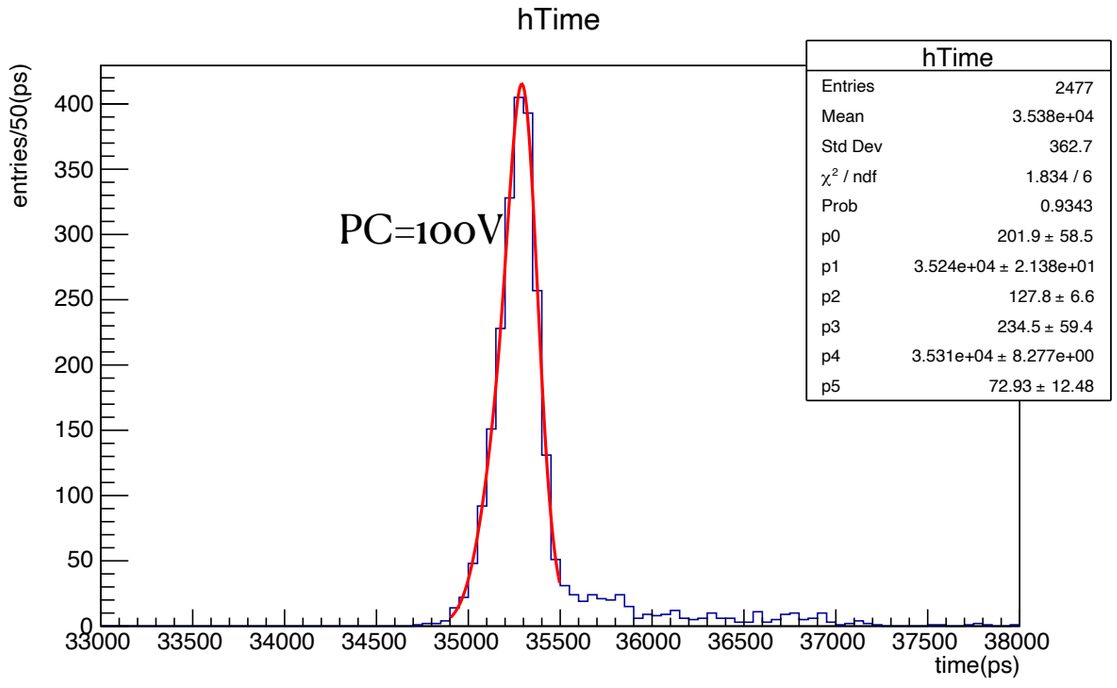


when fitted with a single Gaussian

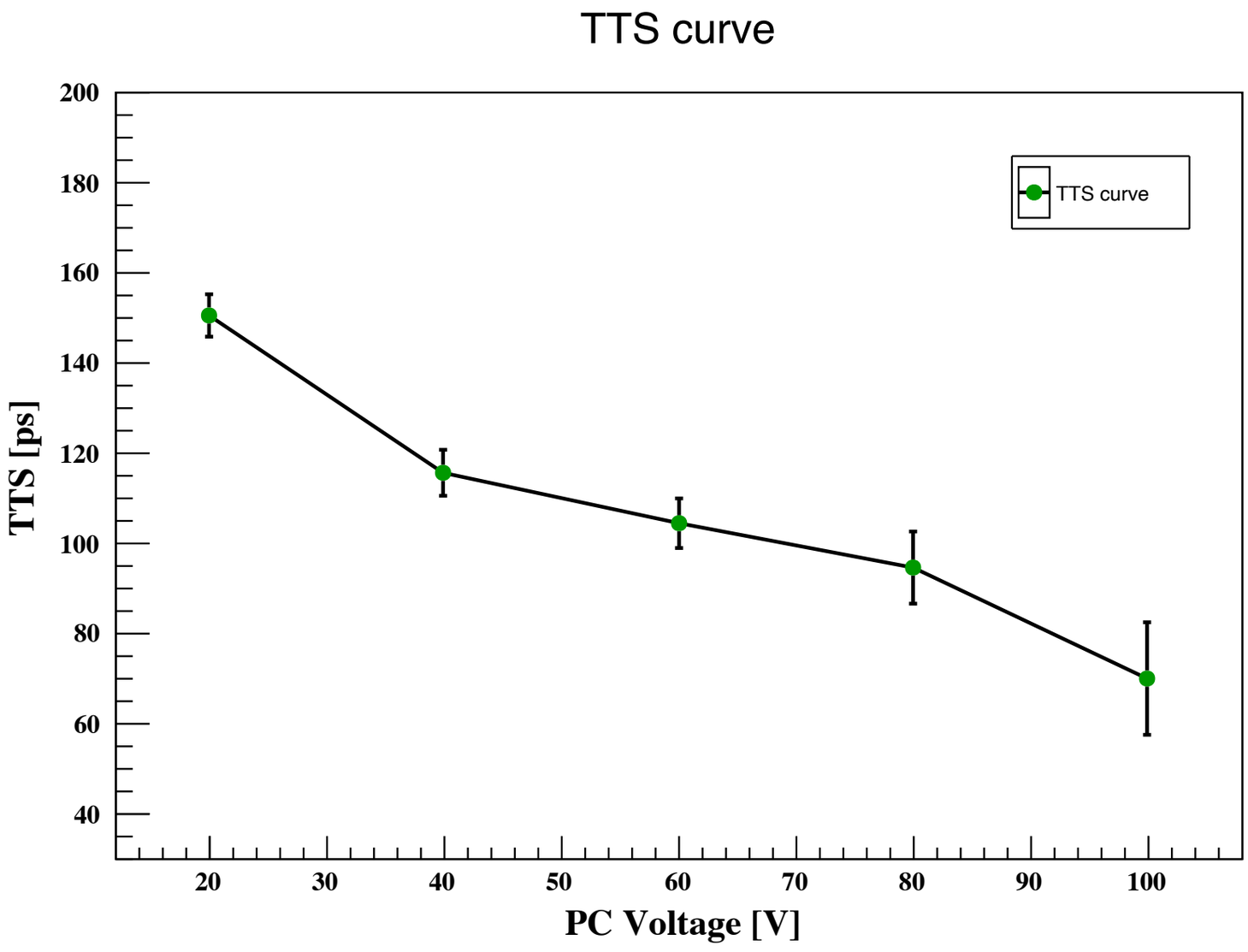
Fitting with a double Gaussian



When fitted with a double Gaussian



TTS vs PC voltage



When fitted with single (20, 40) and double Gaussian