RD50-MPW2 timing measurements with Sr-90

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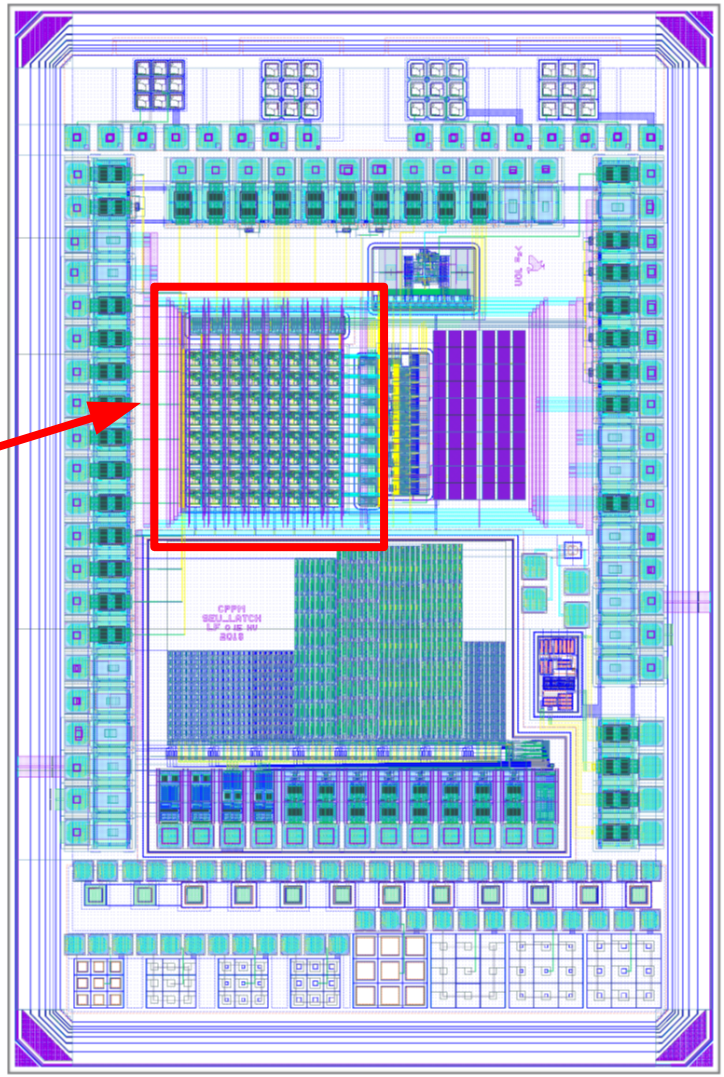
RD50-MPW2

LFoundry 150 nm, 1900 Ωcm,
V_{bias} = -100 V

CMOS chip, designed by
Liverpool and Vienna

8x8 active pixel matrix
(60x60 µm² pixel size)
Large electrode pixel

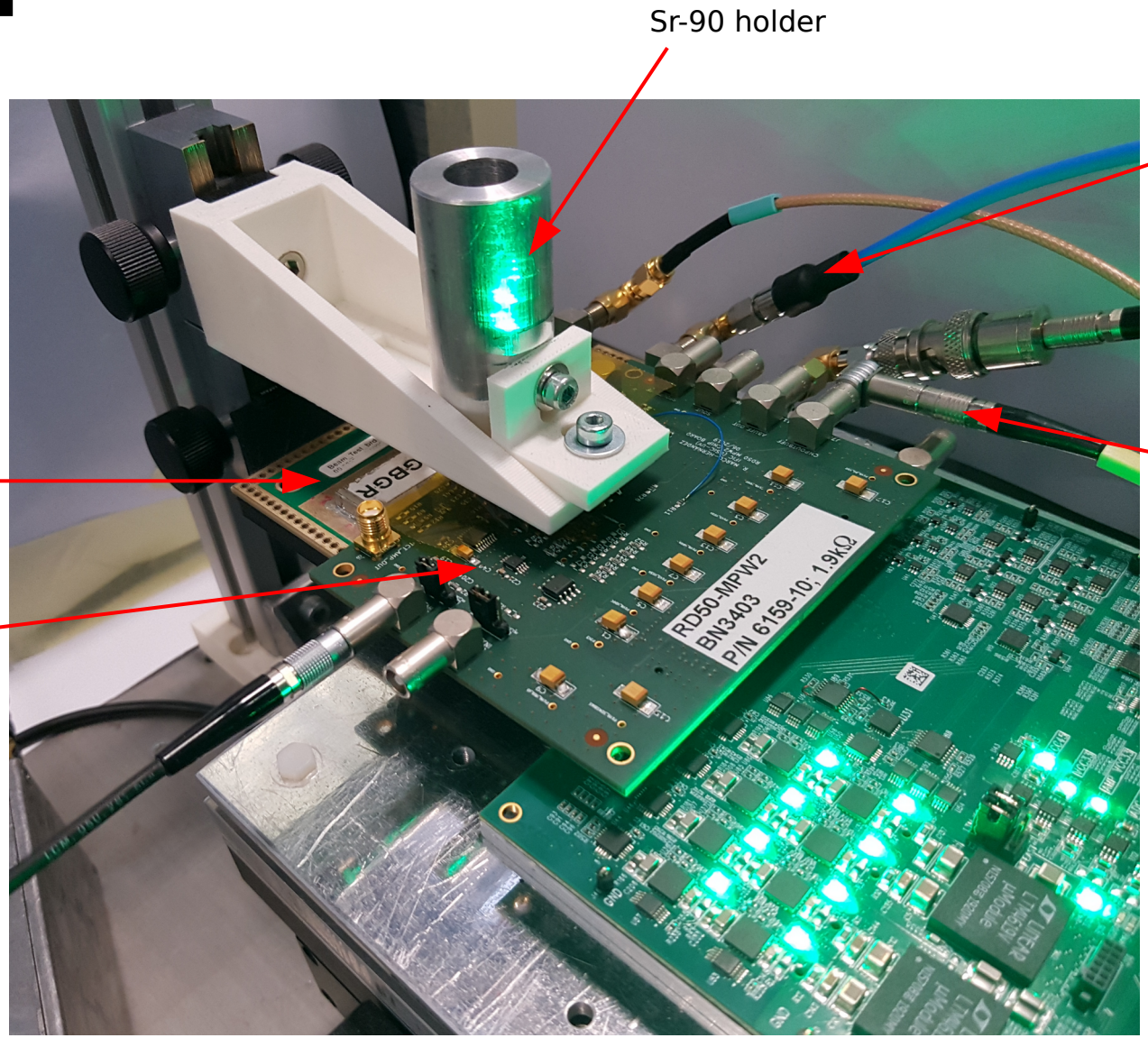


Continuous-reset pixel

Time over threshold proportional
to injected charge

Timing and jitter measurements
with Sr-90

Setup



MPW2 board mounted on stages for alignment

Measurements

Reading out single 60x60 μm² pixel,

Rate ~100 events/h

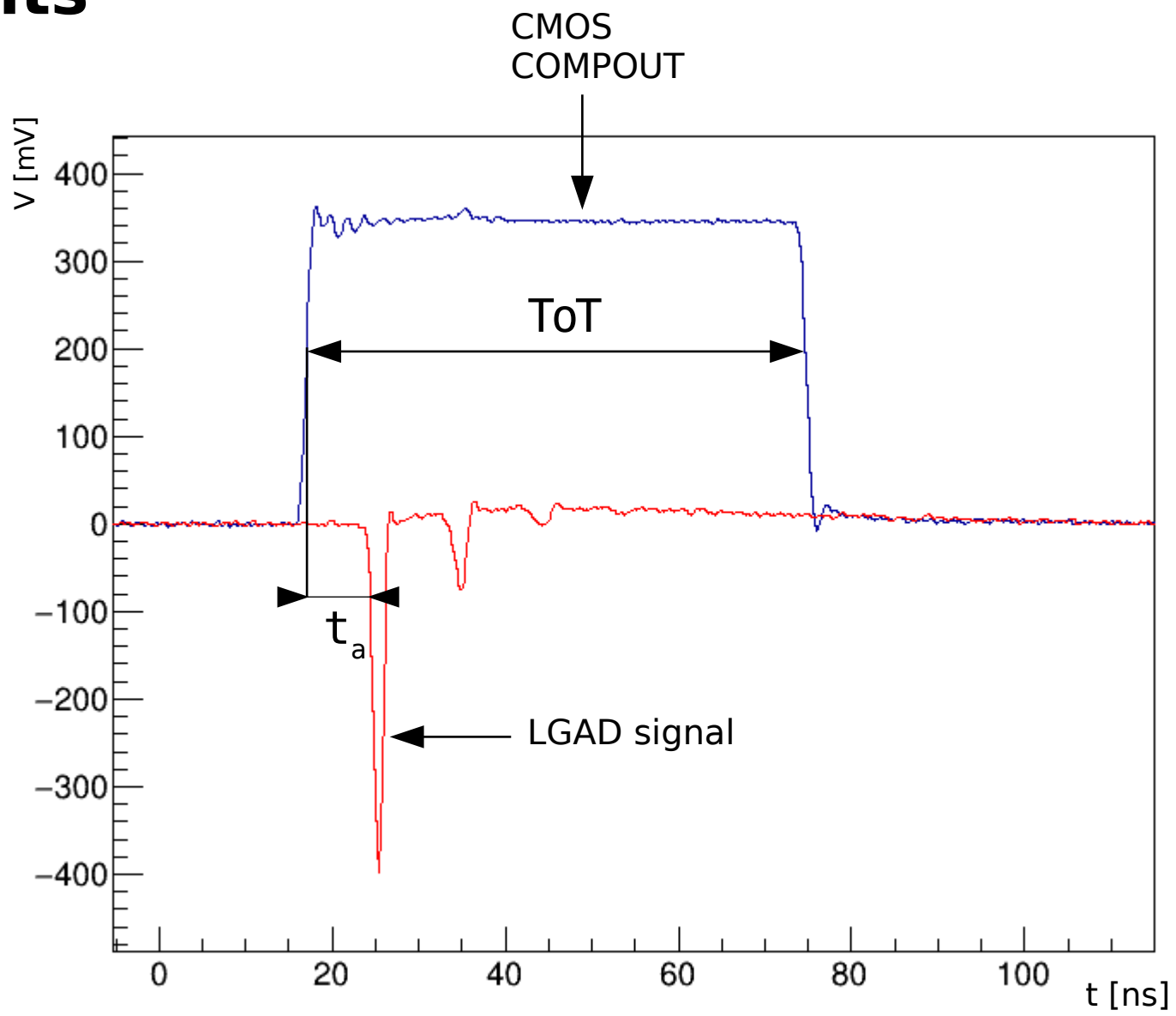
Thresholds:

CMOS - 200 mV

LGAD - CFD at 20%

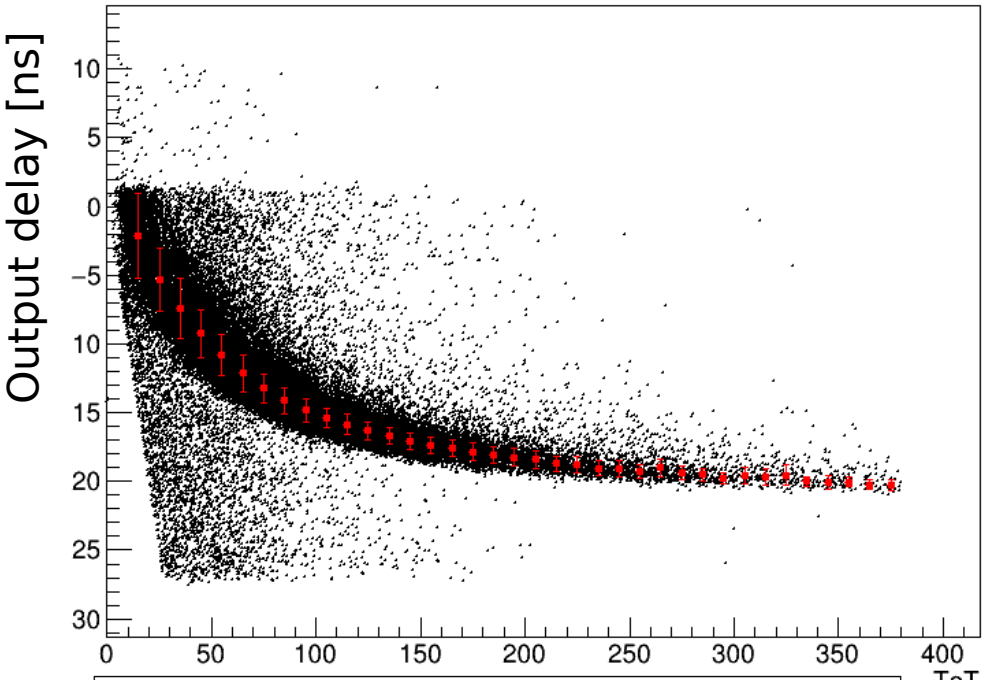
Trigger:

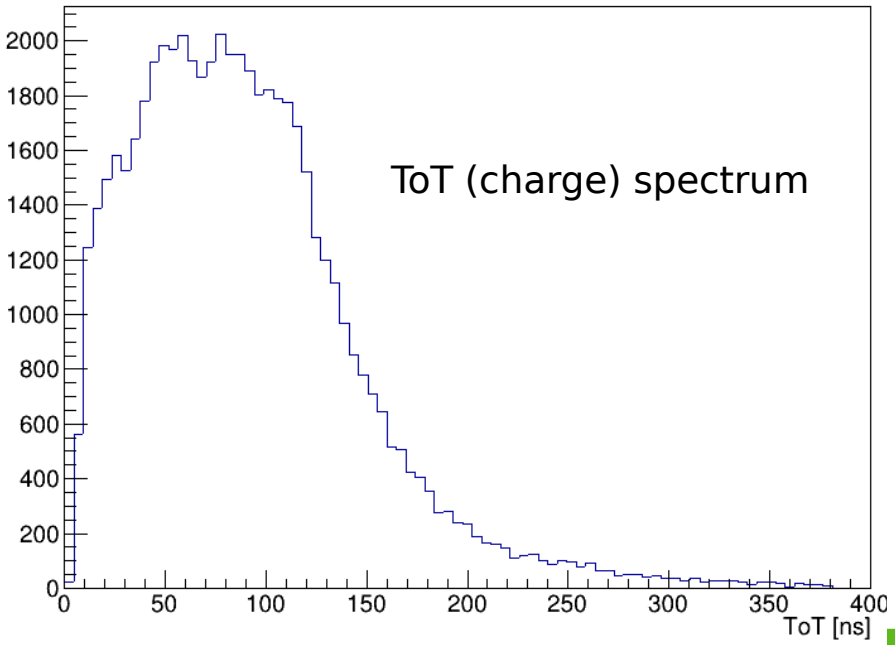
Both channels simultaneously over their respective thresholds
→ Coincidence event

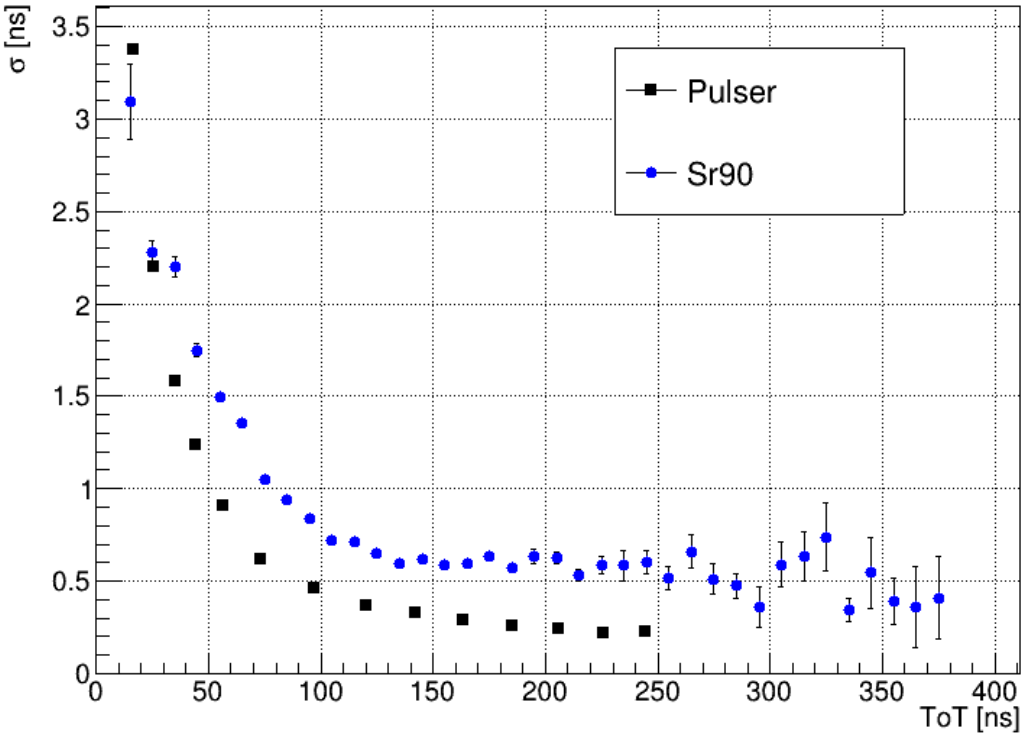


Results

Unirradiated sample



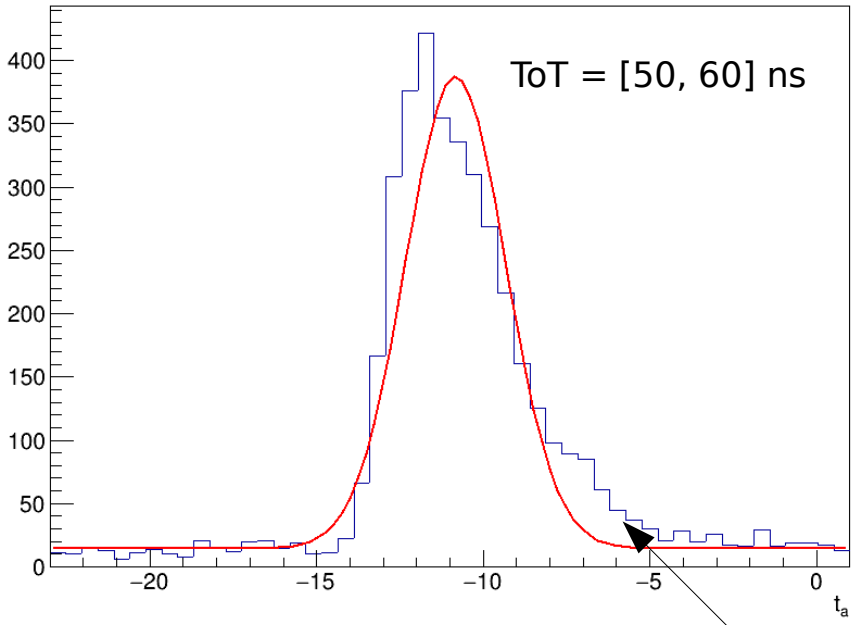


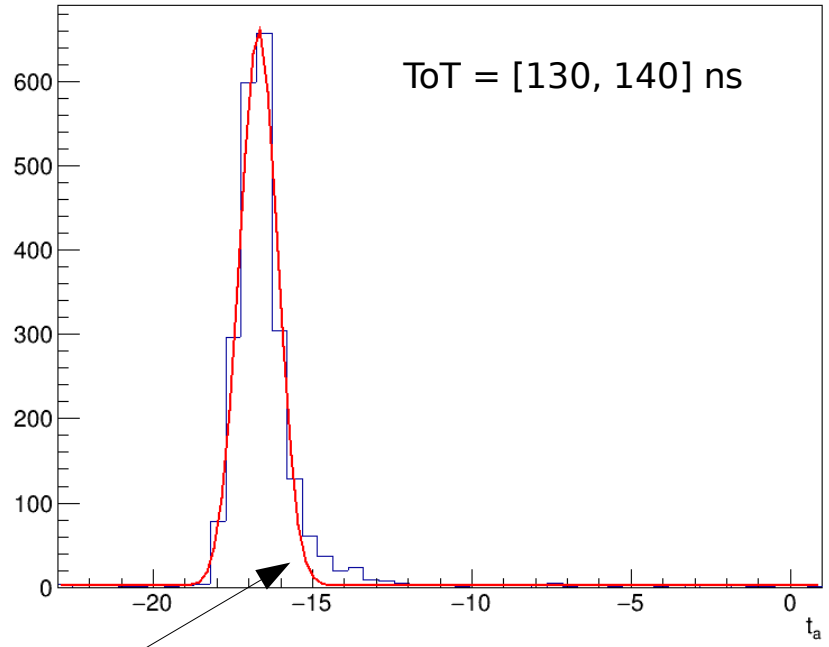


- ~55 000 events recorded
- Gaussian fit with background

Results

Unirradiated sample

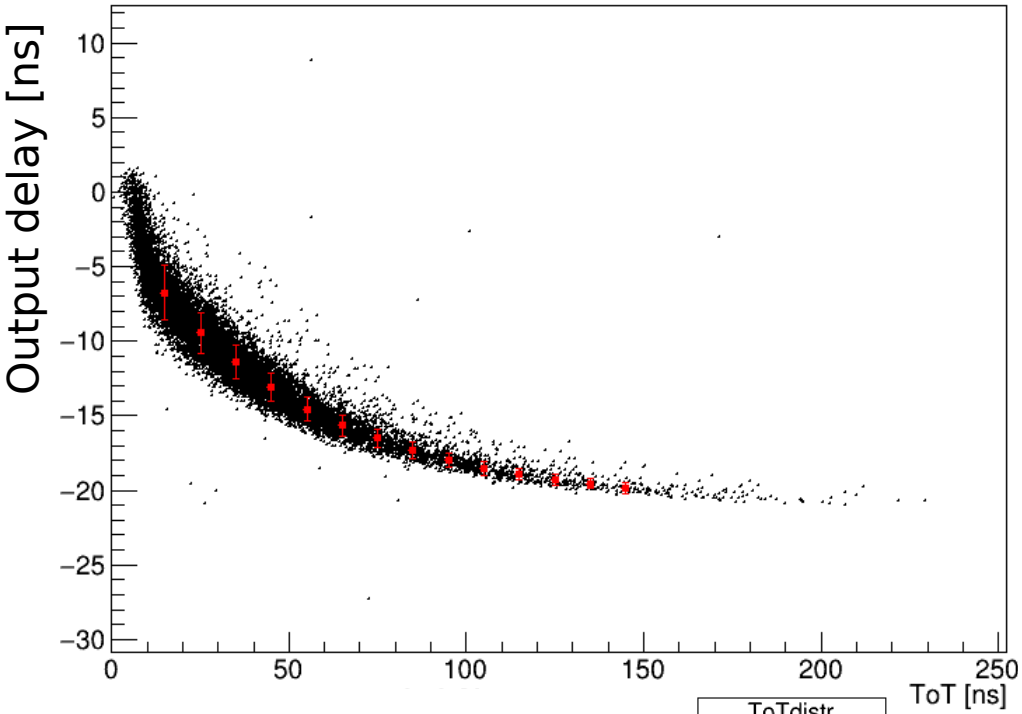


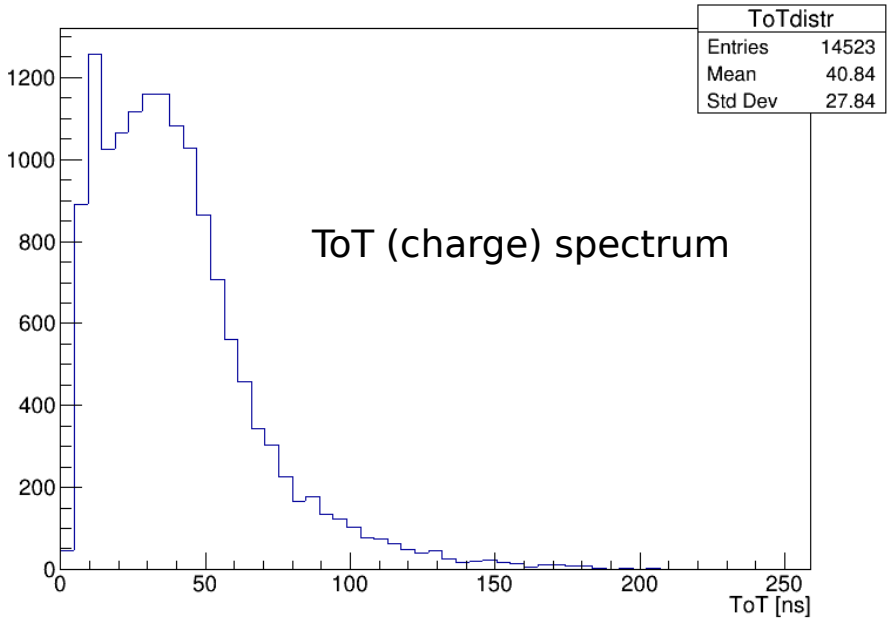


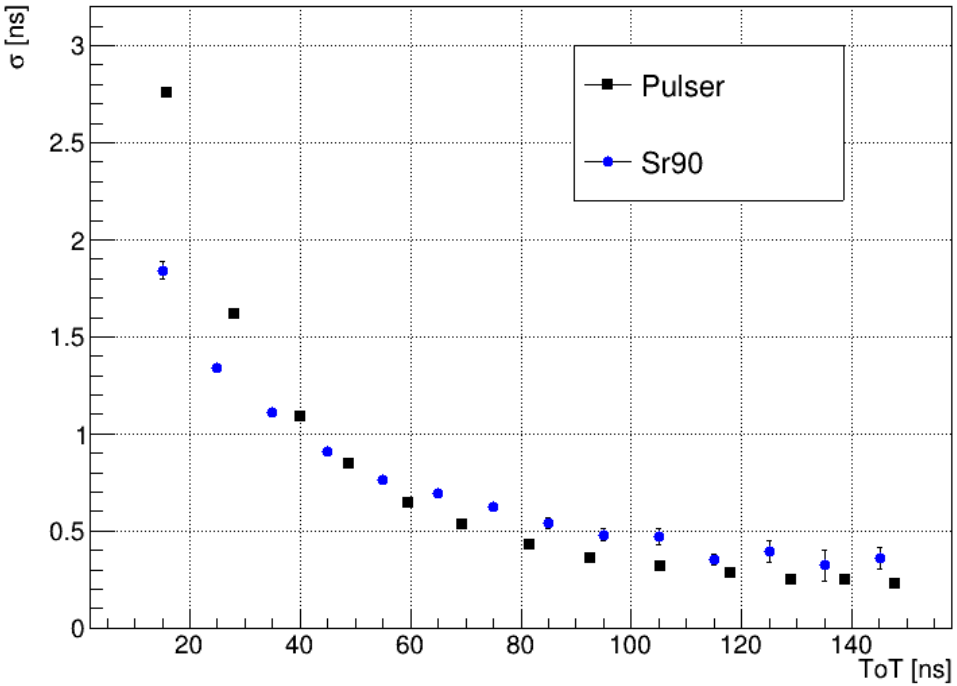
Tail towards slower signal arrivals

Results

5e14 n/cm² sample



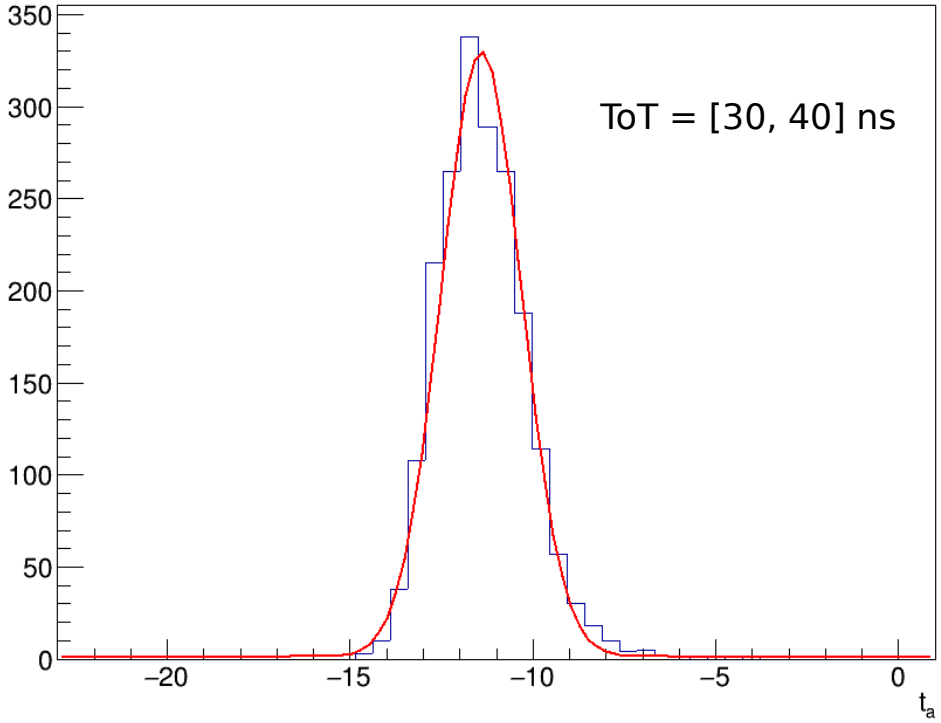


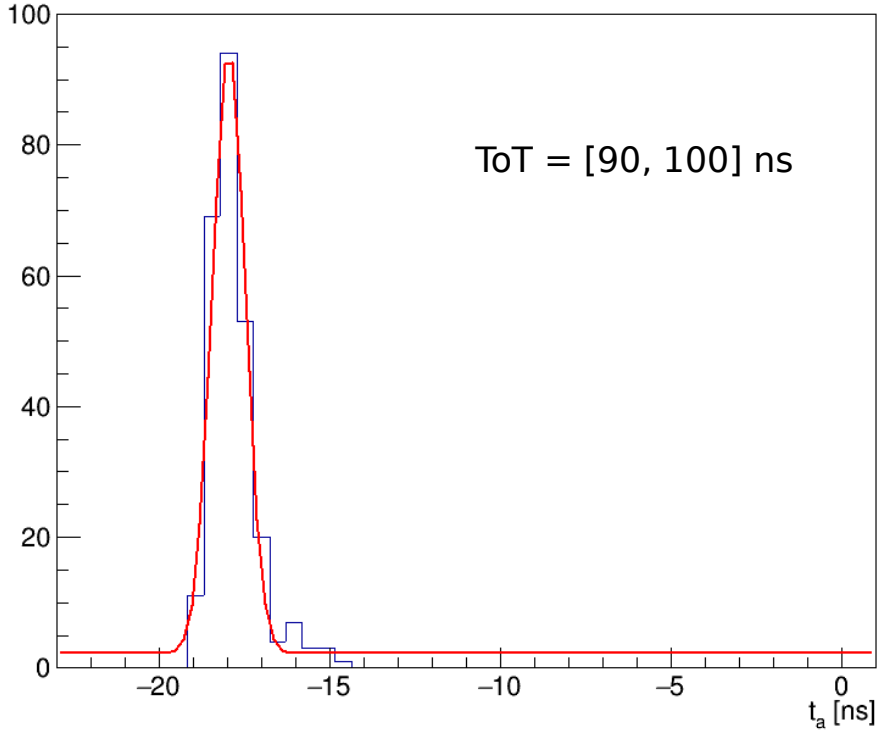


- Event acquisition still in progress
- ~15 000 events collected so far

Results

5e14 n/cm^2 sample



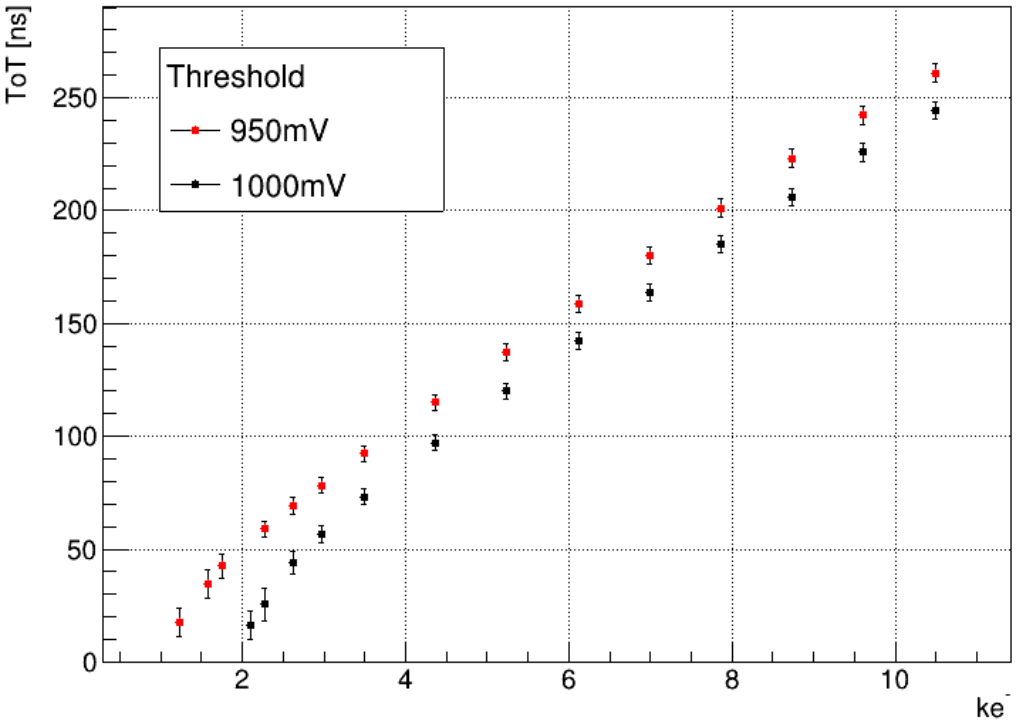


- Tails in distributions not present in irradiated sample
- More charge reaching the depletion layer via diffusion in unirradiated sample due to slower recombination

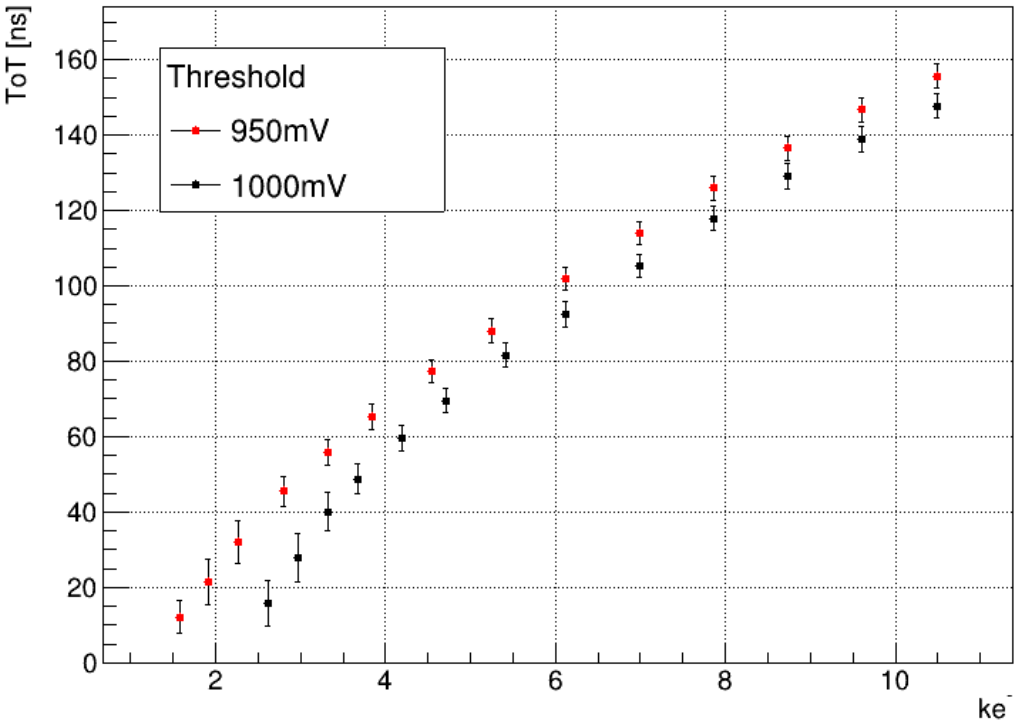
Backups

Backups

Unirradiated

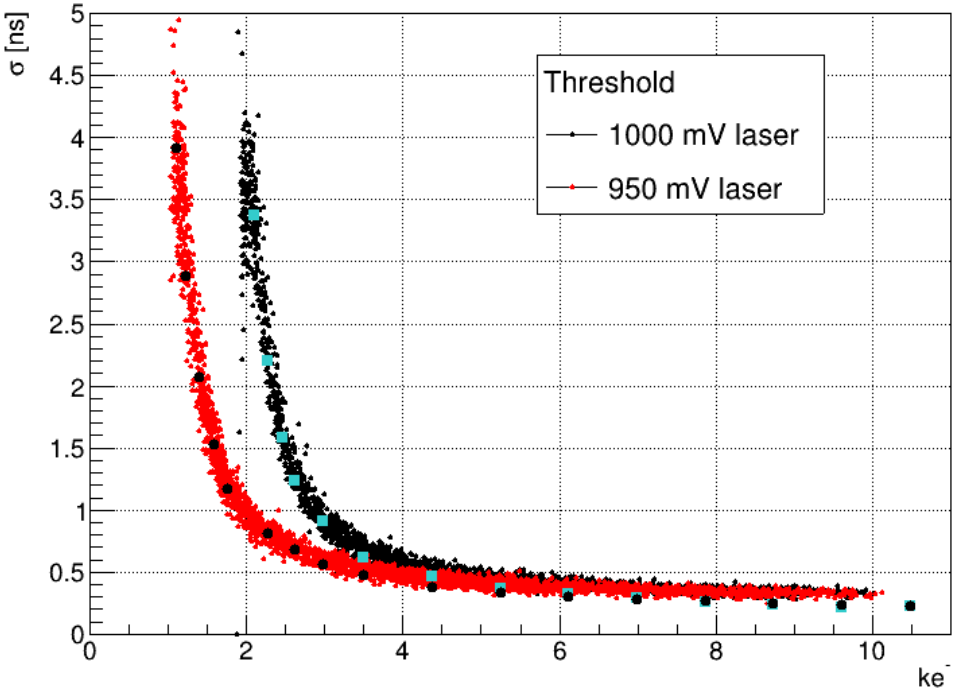


5e14 n/cm^2

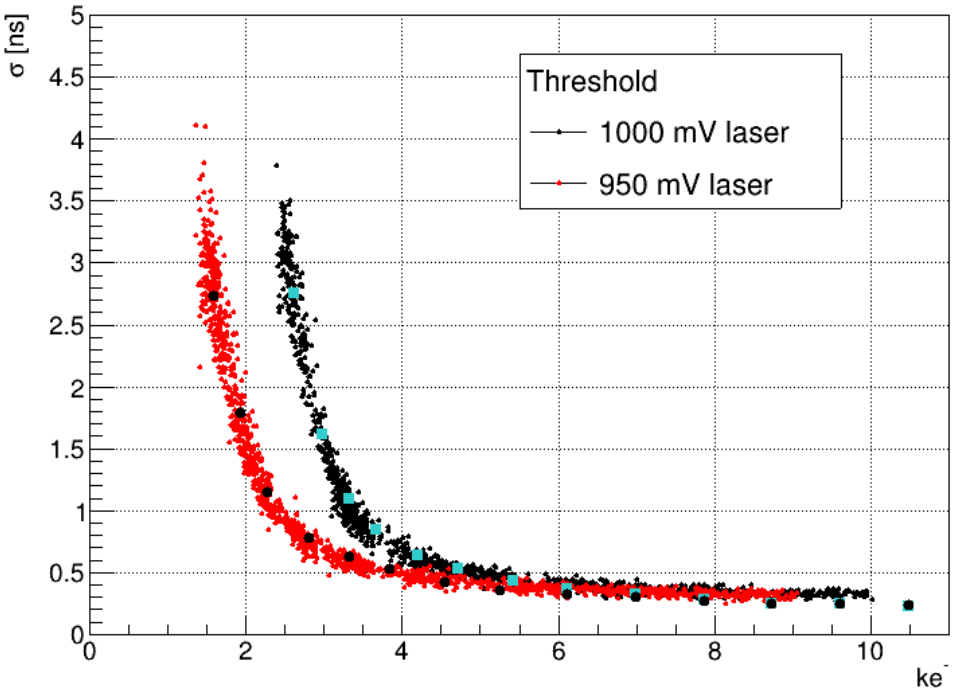


Backups

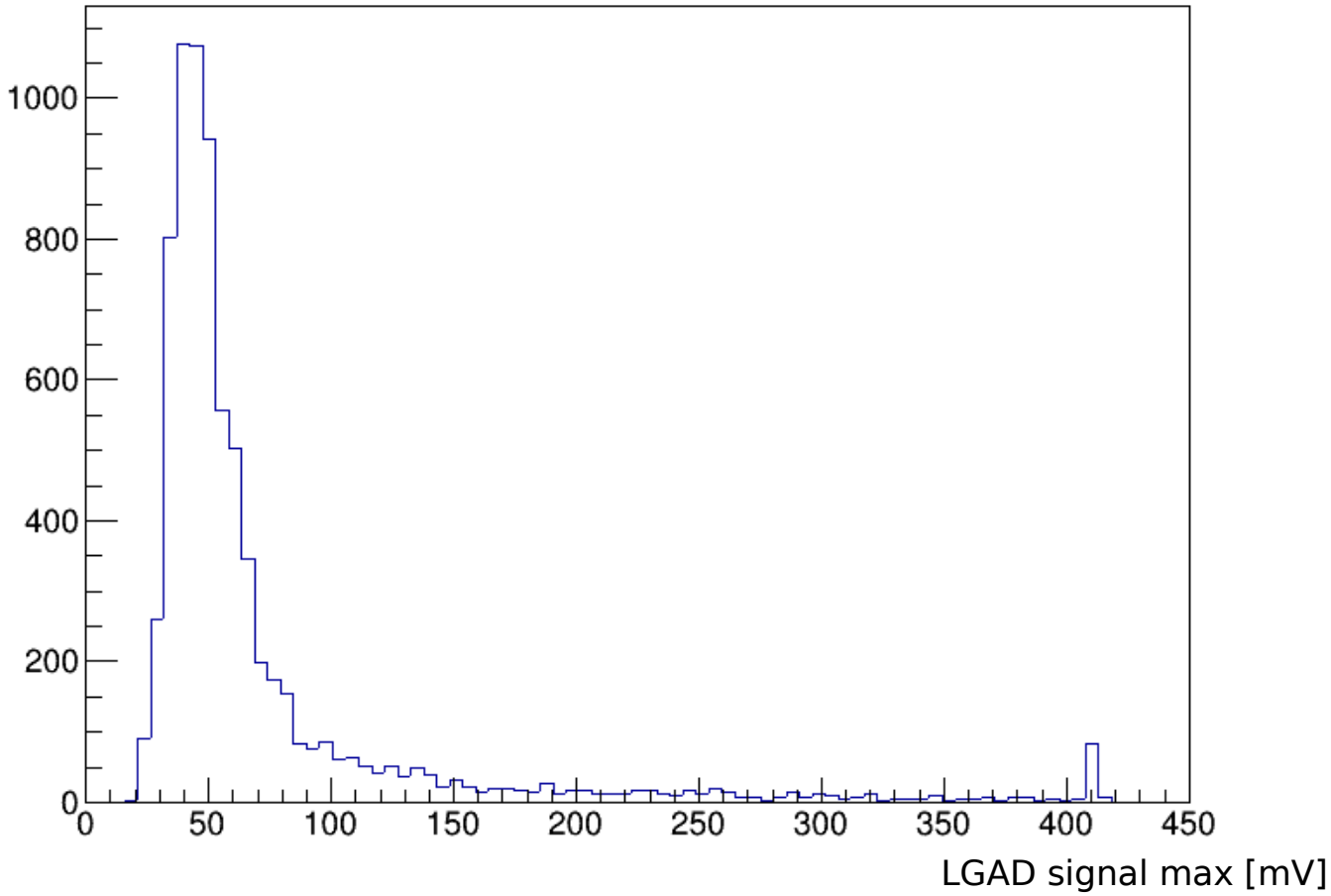
Unirradiated



5e14 n/cm^2



Backups


1000
800
600
400
200
0
0
50
100
150
200
250
300
350
400
450
LGAD signal max [mV]