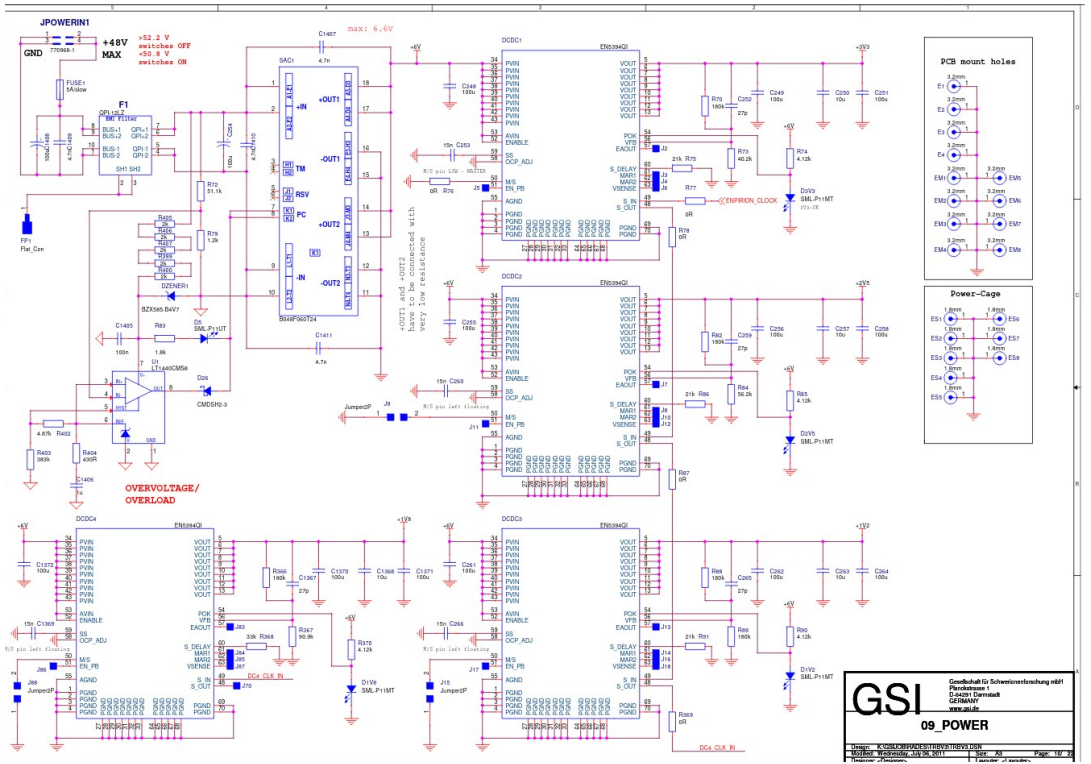
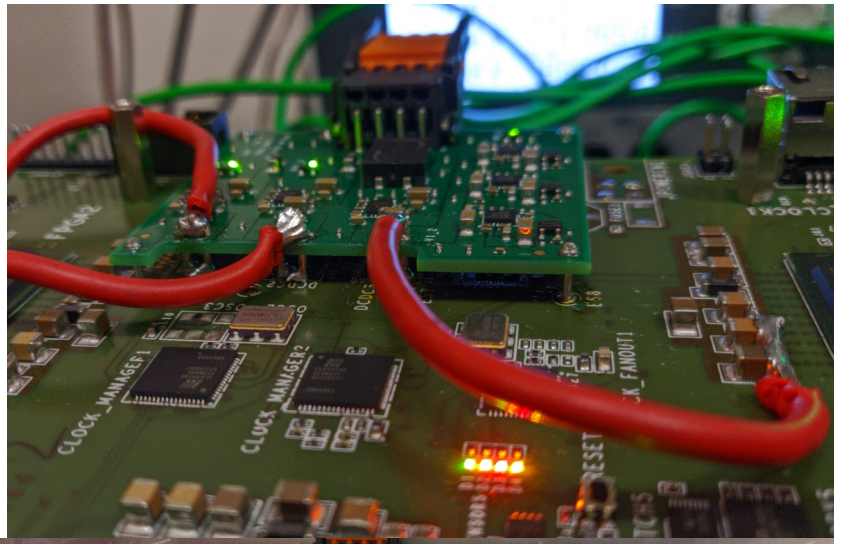
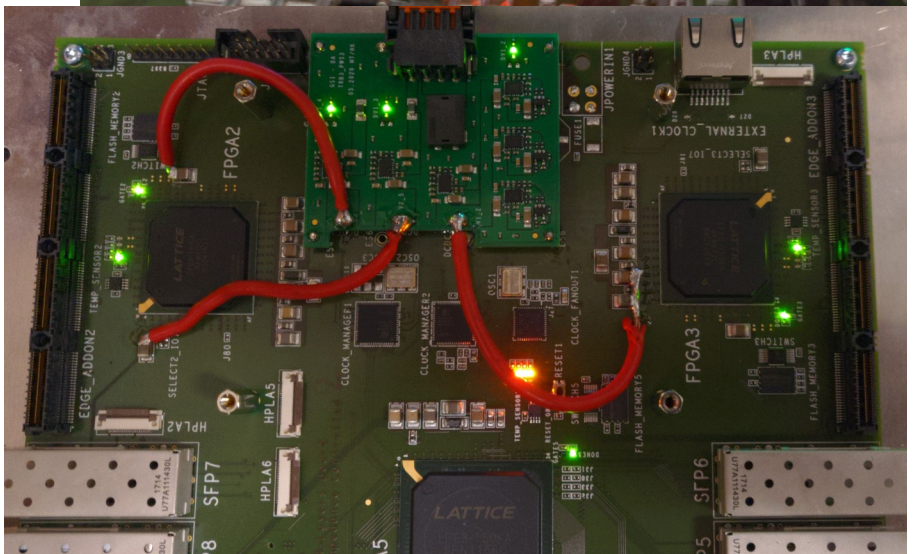
TRB3 linear vs. DCDC Power in

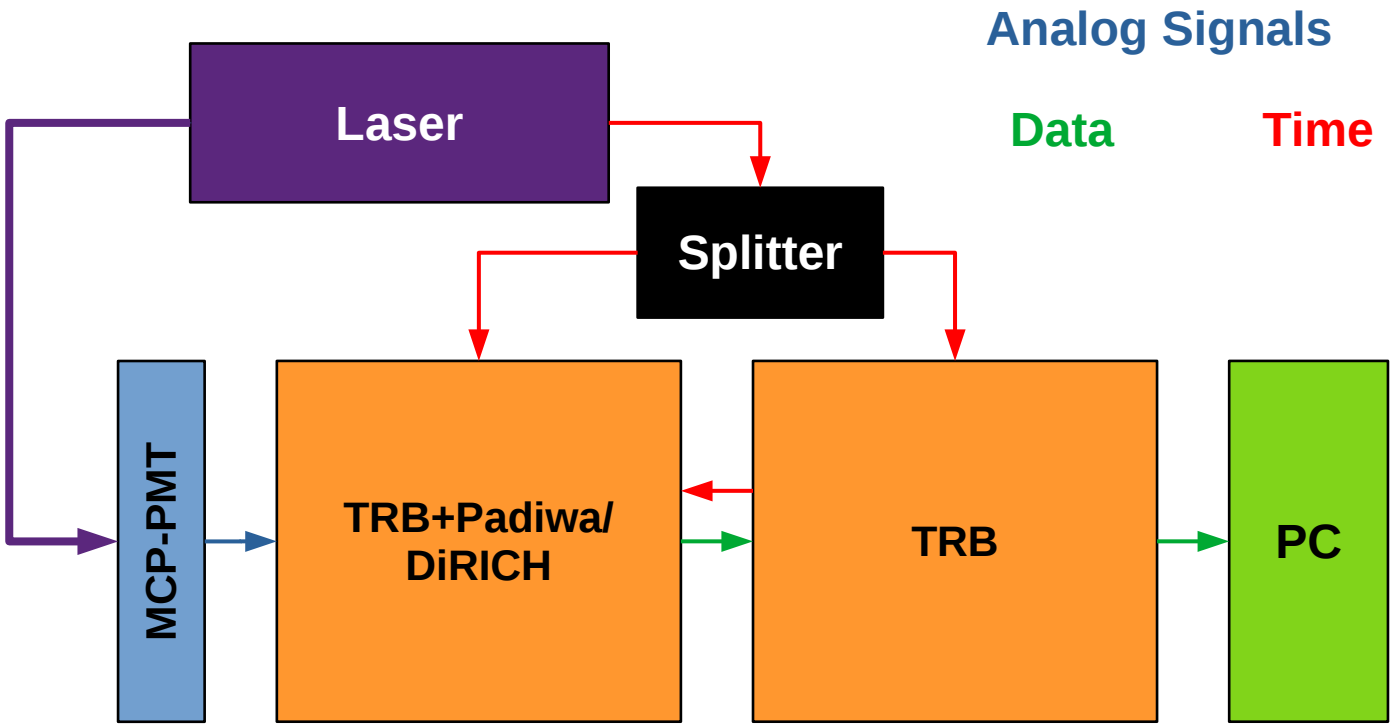
- Powering the TRBv3 either with LDOs or DCDC converters



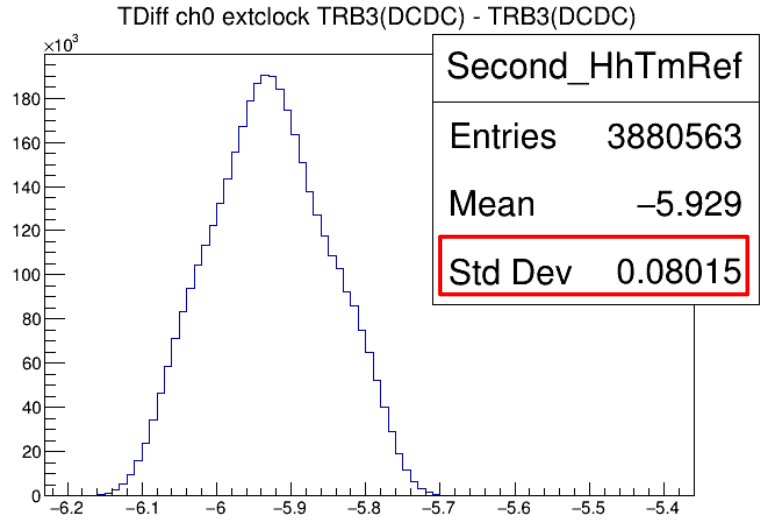


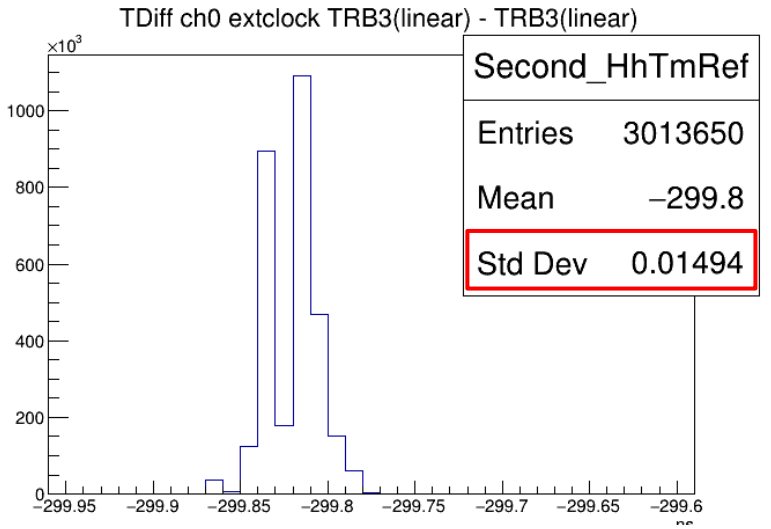


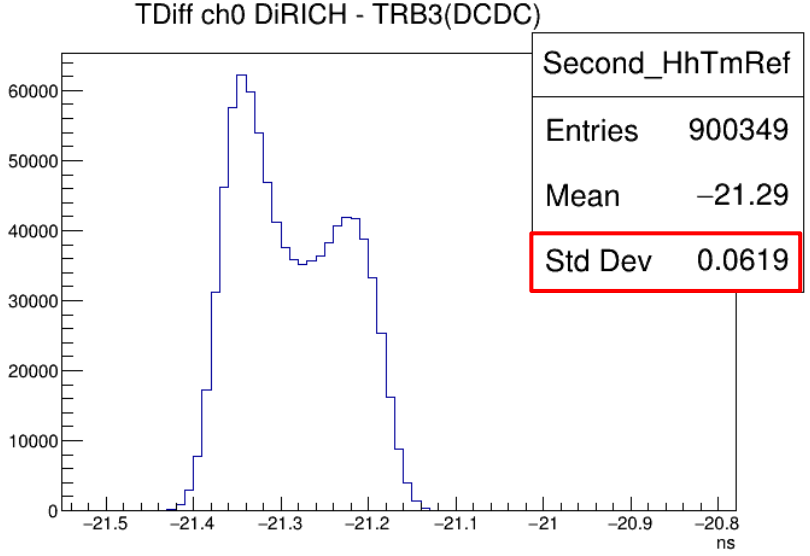
Measurement overview

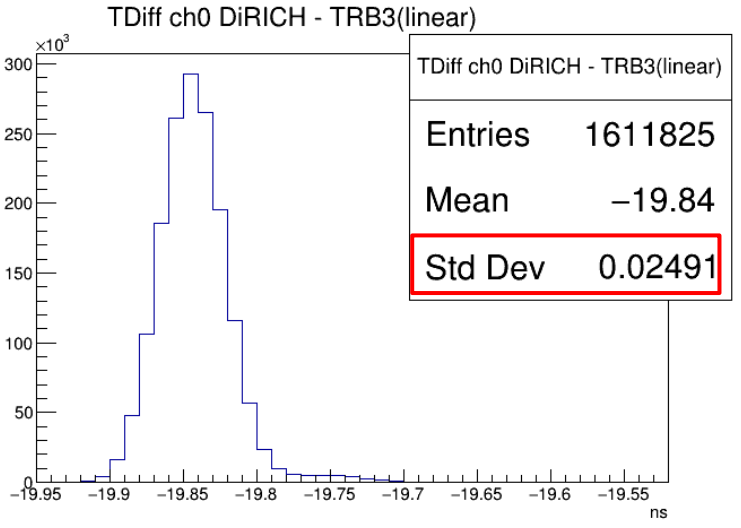


Ch0 Timing with internal Pulser



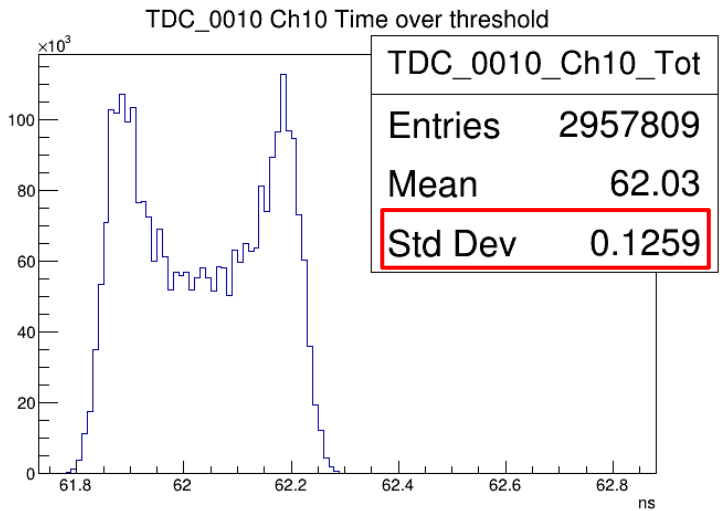


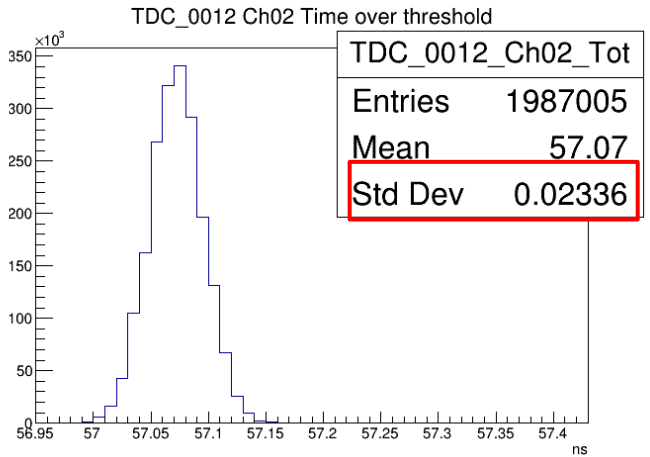


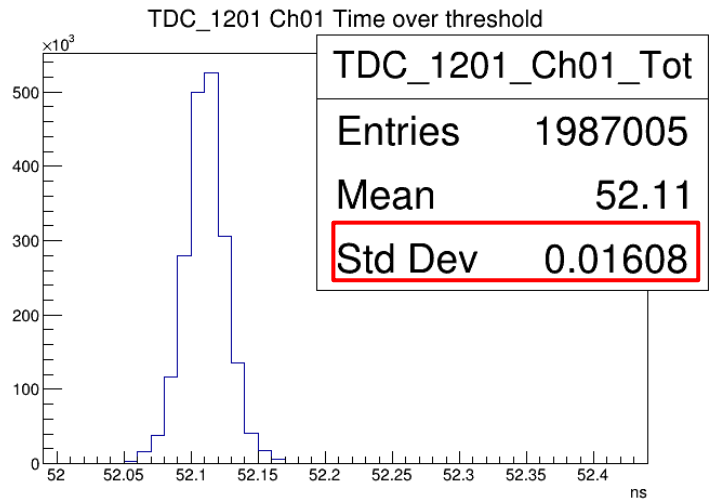


ToT distribution with internal calibration pulser

TRB(DCDC) TRB(linear) DiRICH

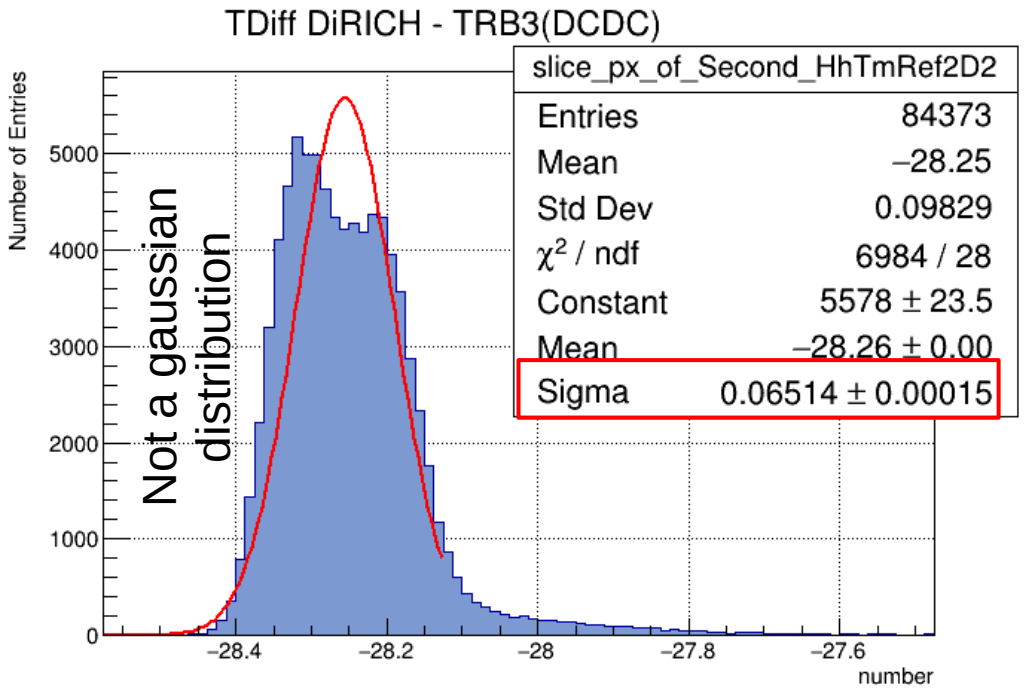


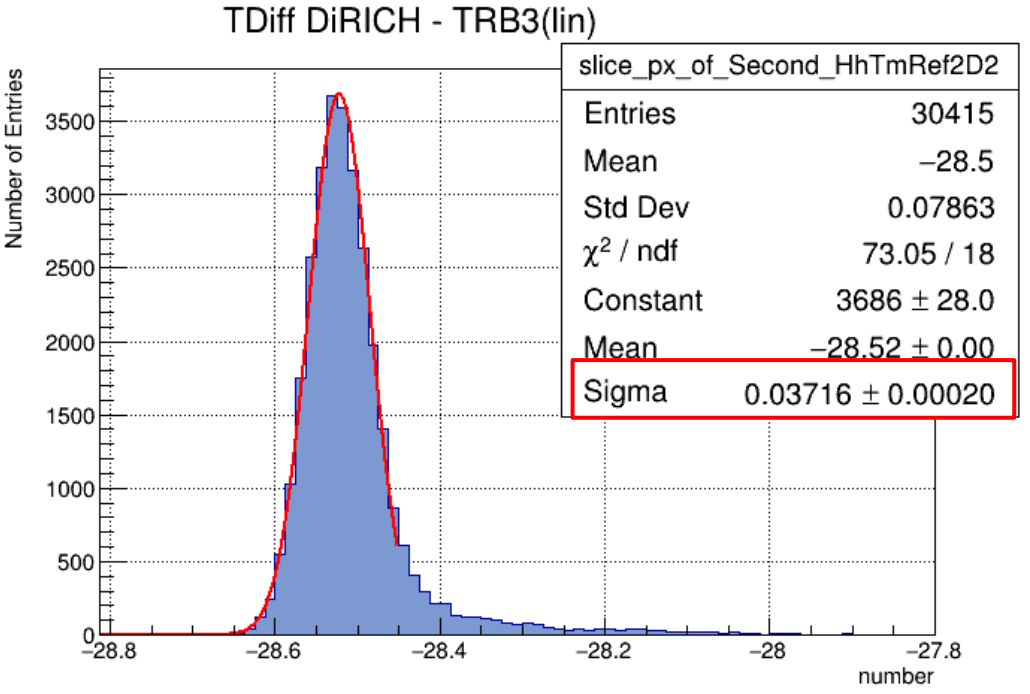




Measurements with Photonis 9002150

- One central Pixel (44)
- Applying timewalk correction (one ToT-Slice), Gaussian fit to the main peak



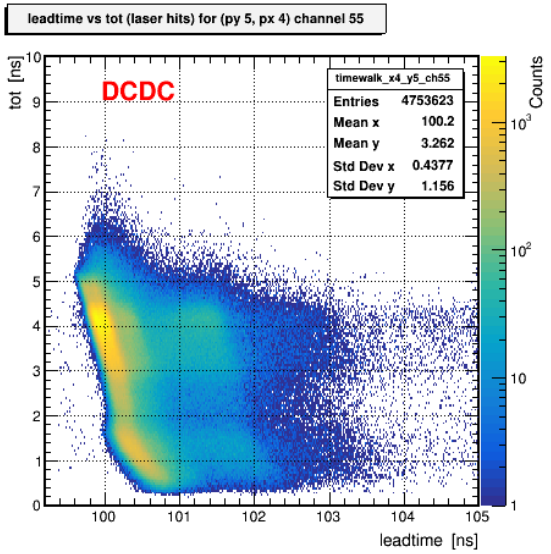


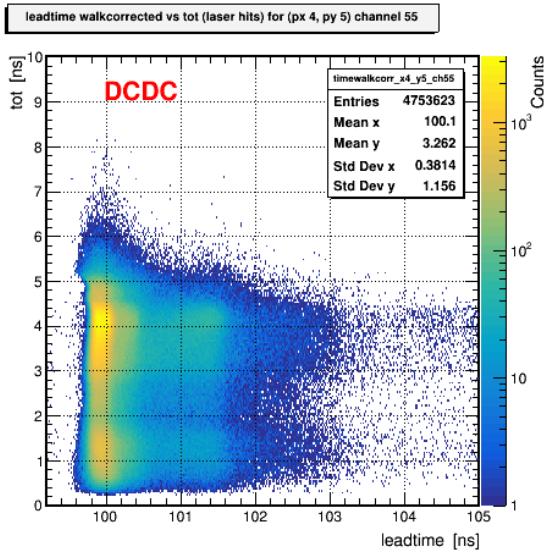
Measurements with Photonis 9002150

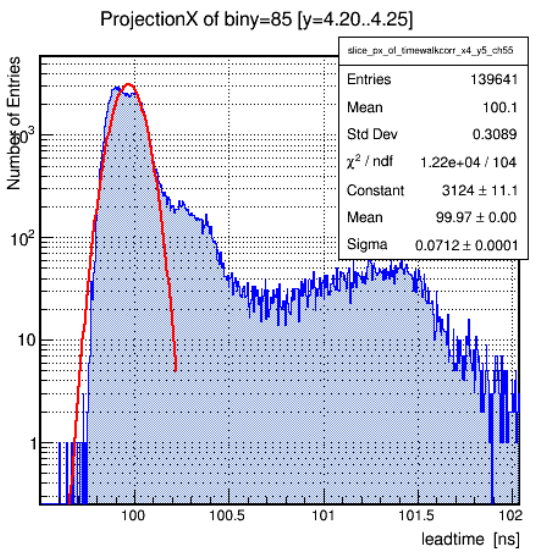
- One central Pixel (44)
- Applying timewalk correction (one ToT-Slice), Gaussian fit to the main peak

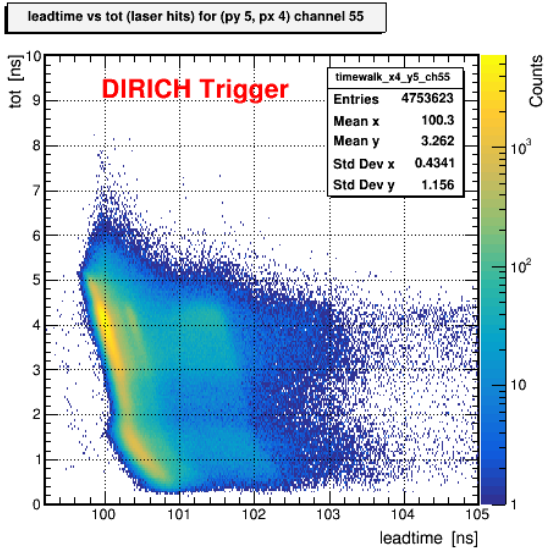
Time Laser	TRB3 DCDC	TRB3 LDO	DiRICH	TRB3 DCDC	TRB3 DCDC	TRB3 LDO
Time MCP-PMT	DiRICH	DiRICH	DiRICH	same Board Padiwa3	TRB3 DCDC Padiwa3	TRB3 LDO Padiwa3
Sigma [ps]	65	35-40	38	49	85	44

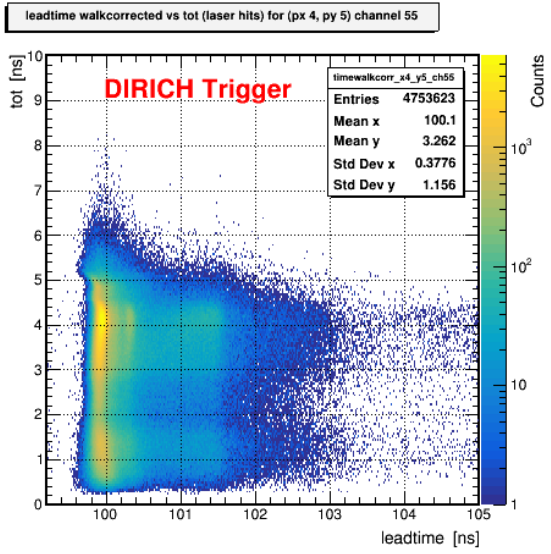
Not a gaussian distribution

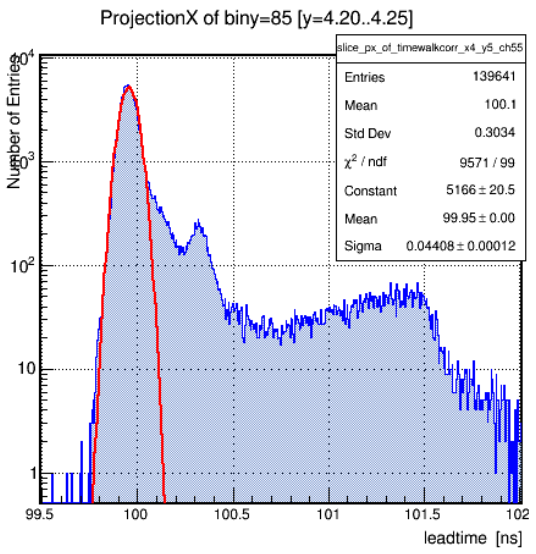

leadtime vs tot (laser hits) for (py 5, px 4) channel 55
DCDC
timewalk_x4_y5_ch55
Entries 4753623
Mean x 100.2
Mean y 3.262
Std Dev x 0.4377
Std Dev y 1.156
tot [ns]
leadtime [ns]
Counts


leadtime walkcorrected vs tot (laser hits) for (px 4, py 5) channel 55
DCDC
timewalkcorr_x4_y5_ch55
Entries 4753623
Mean x 100.1
Mean y 3.262
Std Dev x 0.3814
Std Dev y 1.156
tot [ns]
leadtime [ns]
Counts

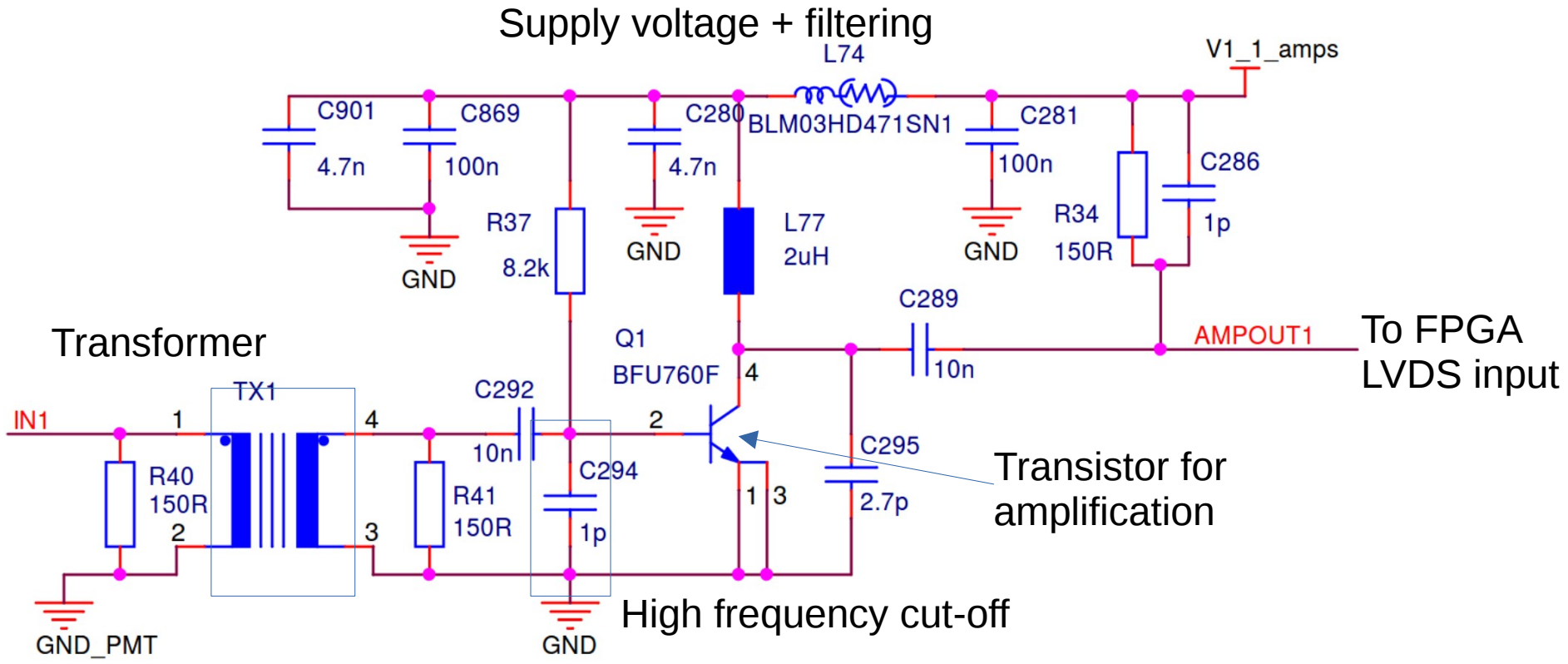

ProjectionX of biny=85 [y=4.20..4.25]
slice_px_of_timewalkcorr_x4_y5_ch55
Entries 139641
Mean 100.1
Std Dev 0.3089
χ² / ndf 1.22e+04 / 104
Constant 3124 ± 11.1
Mean 99.97 ± 0.00
Sigma 0.0712 ± 0.0001
Number of Entries
leadtime [ns]


leadtime vs tot (laser hits) for (py 5, px 4) channel 55
DIRICH Trigger
timewalk_x4_y5_ch55
Entries 4753623
Mean x 100.3
Mean y 3.262
Std Dev x 0.4341
Std Dev y 1.156
tot [ns]
leadtime [ns]
Counts


leadtime walkcorrected vs tot (laser hits) for (px 4, py 5) channel 55
DIRICH Trigger
timewalkcorr_x4_y5_ch55
Entries 4753623
Mean x 100.1
Mean y 3.262
Std Dev x 0.3776
Std Dev y 1.156
tot [ns]
leadtime [ns]
Counts


ProjectionX of biny=85 [y=4.20..4.25]
slice_px_of_timewalkcorr_x4_y5_ch55
Entries 139641
Mean 100.1
Std Dev 0.3034
χ² / ndf 9571 / 99
Constant 5166 ± 20.5
Mean 99.95 ± 0.00
Sigma 0.04408 ± 0.00012
Number of Entries
leadtime [ns]

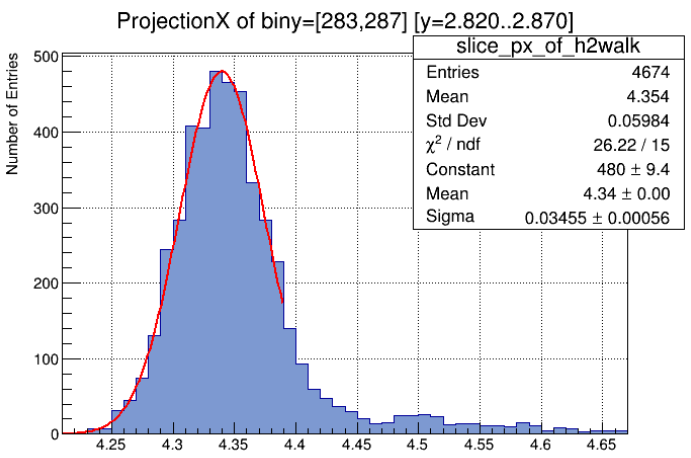
Low pass noise rejection - DiRICH



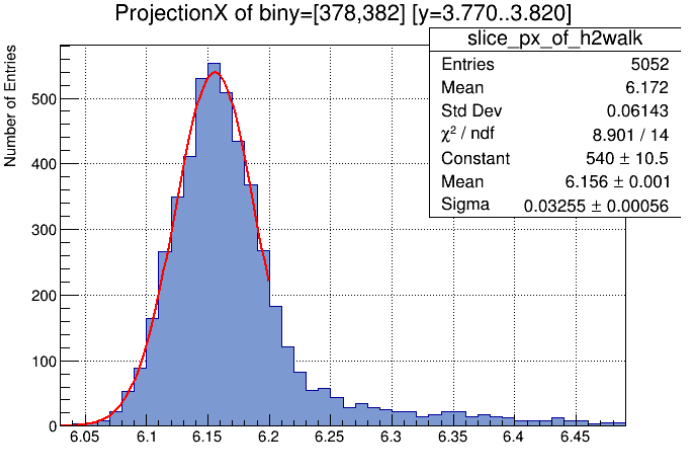
Low pass noise rejection - DiRICH

- Retested with Photonis 9002150
- 1 ToT slice @ 50% s.p.p.

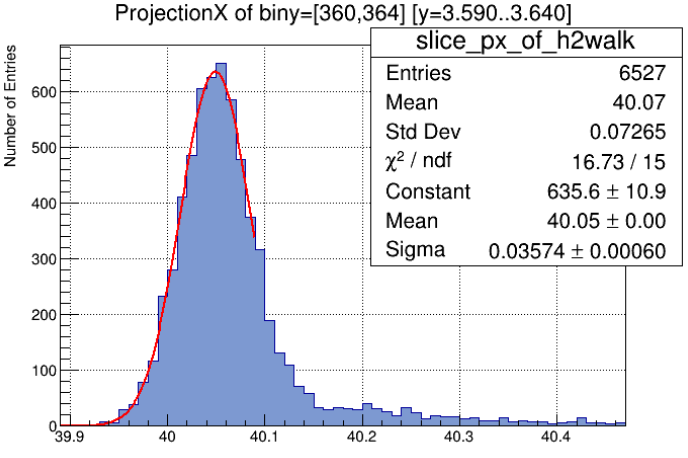
DiRICH 1pF



DiRICH 10pF



Padiwa3



Low pass noise rejection - DiRICH

- Time resolution (sigma) is the same for both configurations
- Signal height is damped by ¼ for 10 pF
- Never seen noise problems with 1 pF
- →1 pF preferable for signals suppressed by the magnetic field

Summary and Outlook

- Powering TRB with LDOs massively improves time resolution
- Padiwa and DiRICH can reach 35-40 ps
- 1pF low pass preferable b/c of higher signals

- Possible problem with SFP modules in B-field