

TRB/DiRICH in the magnetic field

ERLANGEN CENTRE
FOR ASTROPARTICLE
PHYSICS

Merlin Böhm, K. Gumbert, A. Lehmann,
D. Miehling, S. Kraus



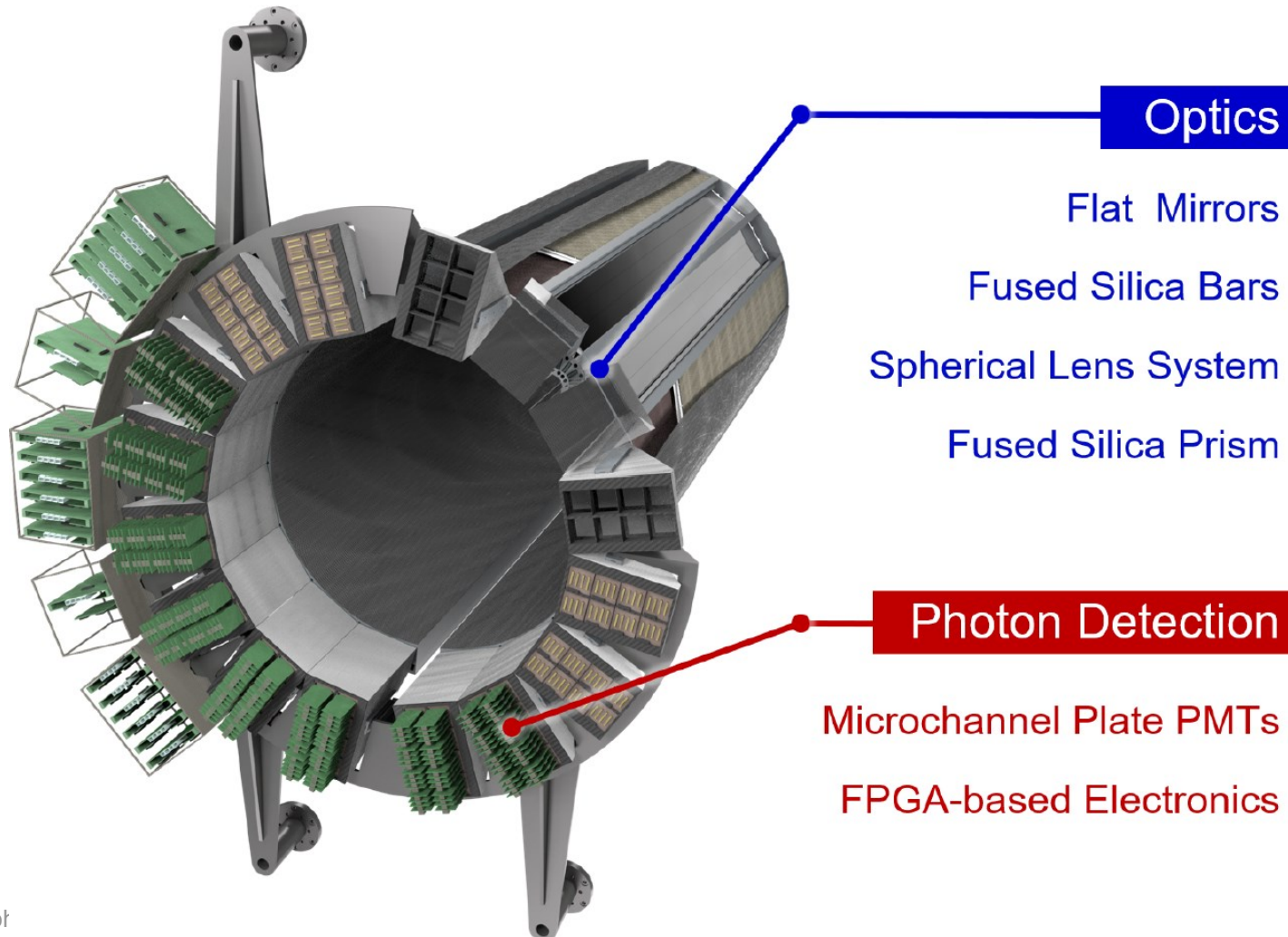
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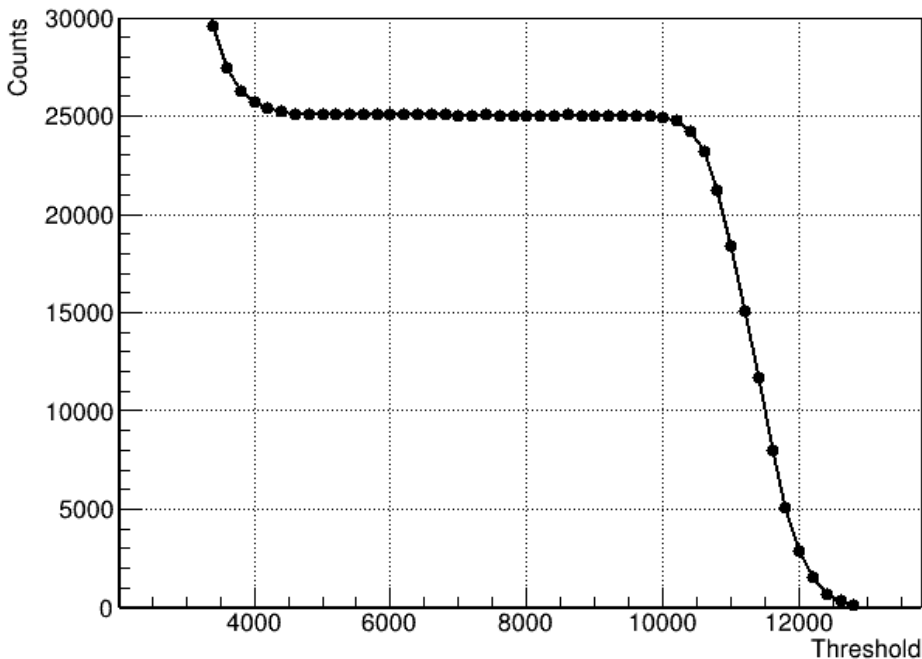
Observations at 3T regarding TRB3

- Measured inside 3T MRI scanner
- Time resolution with internal pulser worsens:
 - 13ps without field
 - 20ps field passes lateral the FPGAs
 - 30ps field passes perpendicular the FPGAs
 - Is it the FPGA or the power source?
- DCDC converters not functional
- -> have to use external power supplies and LDOs (up to 10A @ 1.2V)
- SFP to RJ45 stop working above 0.2T

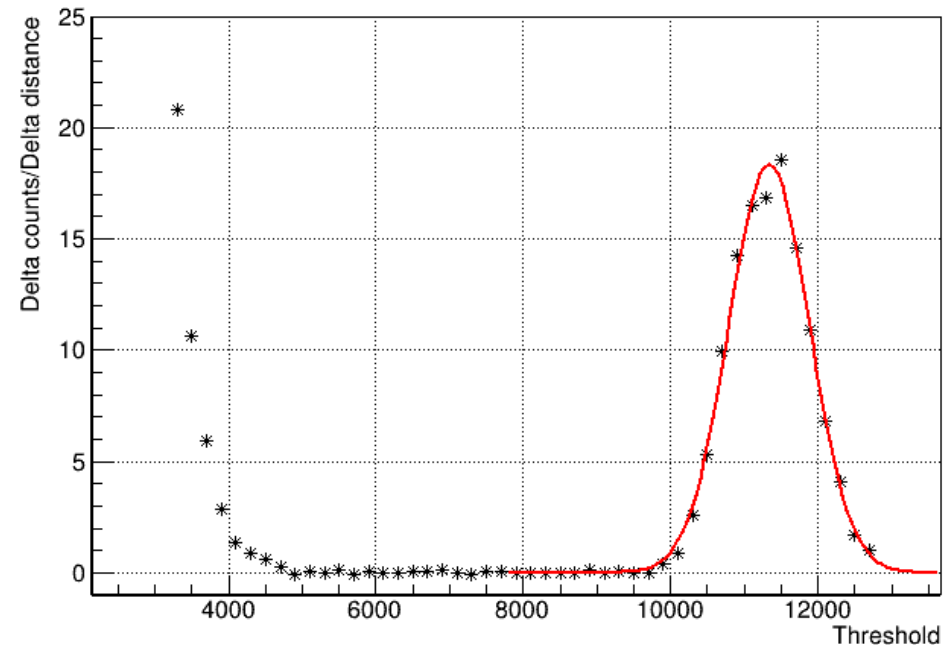
Signal height measurement principle

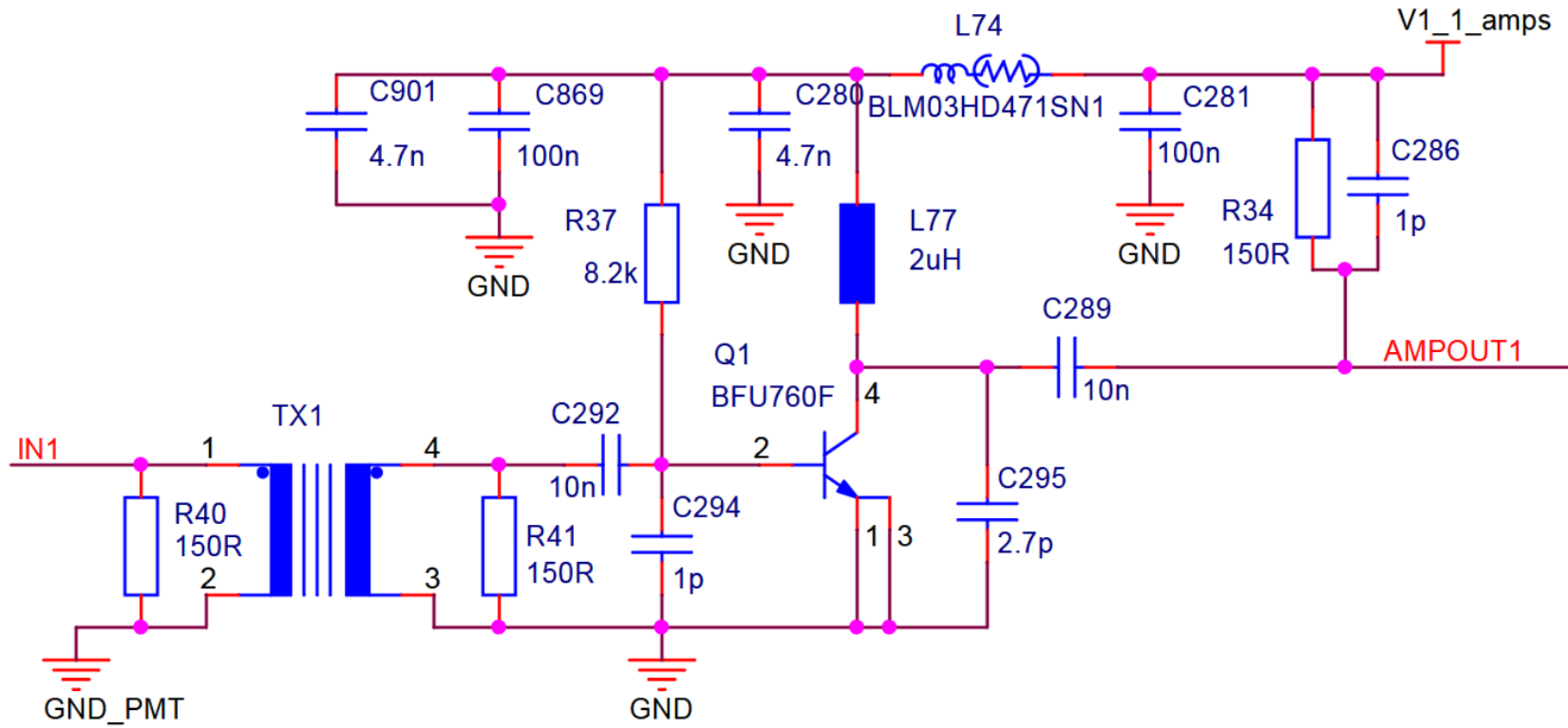
- Feed pulser signal in one channel and vary the threshold and measure the count rate
- Derivative of the count rate gives signal height distribution

25mV no transformer



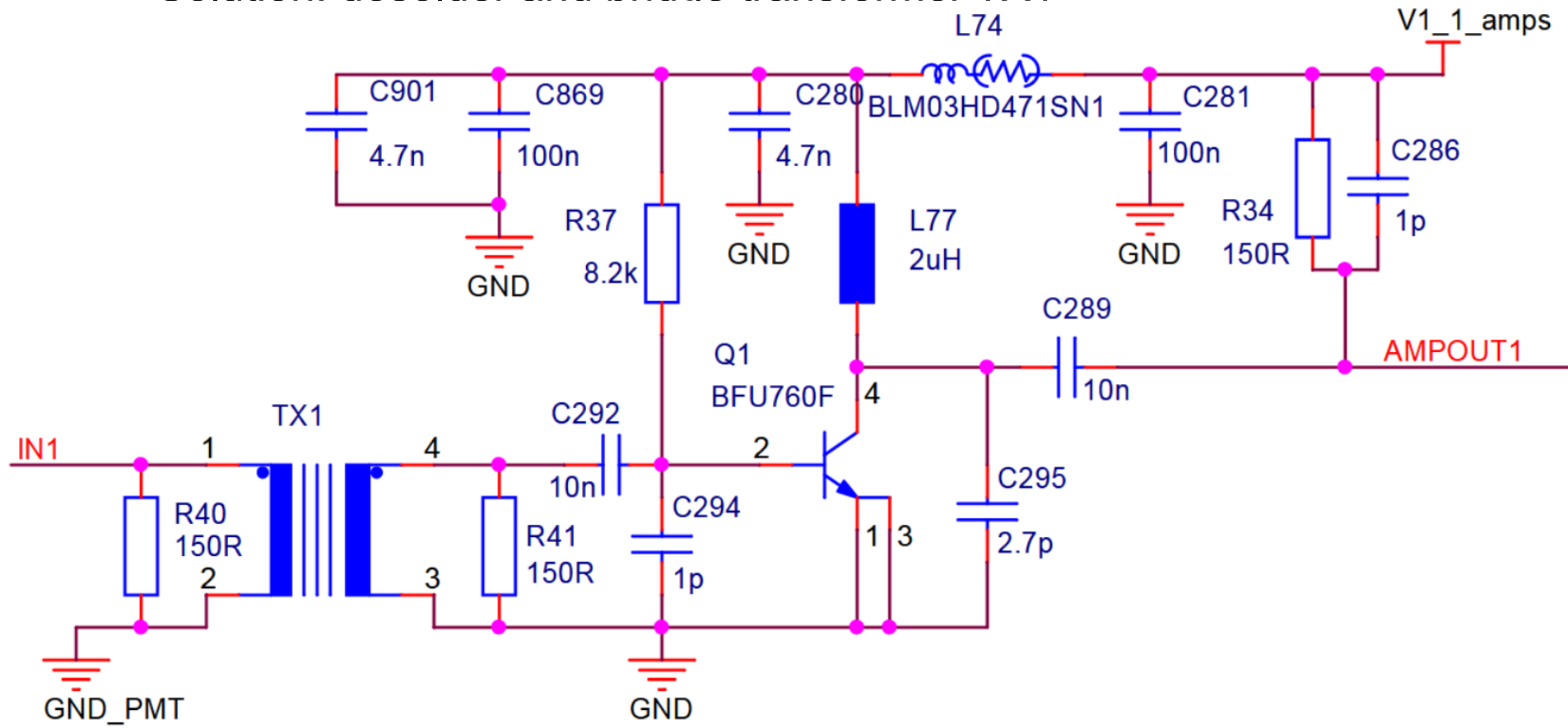
25mV no transformer pulse height





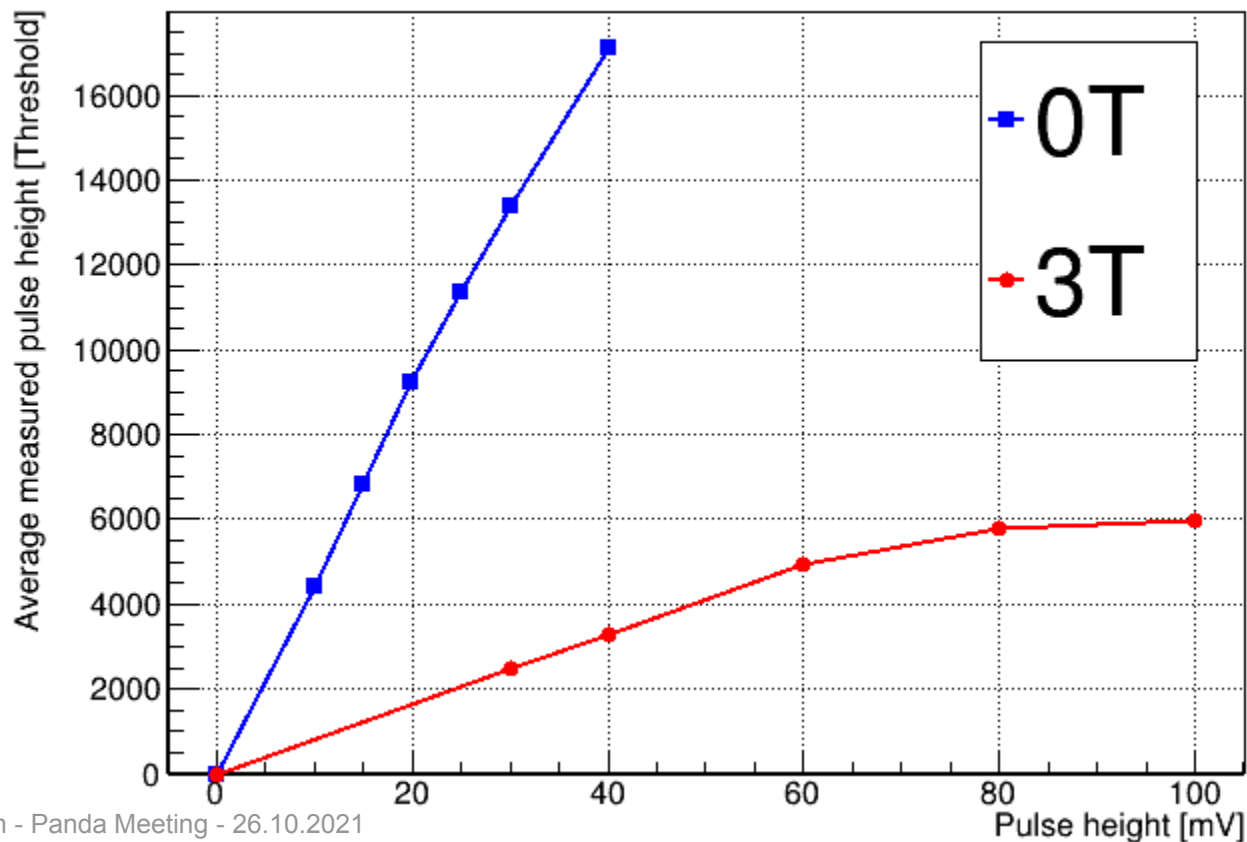
Signal height measurement in B-Field

- First measurement: Signal in B-Field attenuated $\sim 5\times$
- Suspect: transformer in the input stage
- Solution: desolder and bridge transformer TX1



Signal height measurement in B-Field

- Modified channel without transformer
- Point at (0,0) artificially added
- Comparison of slopes gives attenuation factor: 5.5x



Summary and outlook

- TRB3 working in B-Field
- Transformer not responsible for signal attenuation
- Next suspects: Coil L77 or the LDOs
- DiRICH can only measure the voltage in front of the LDOs
- New measurements in the MRI planned with bridged coil and test leads added for voltage measurement at different points
- Issue should be resolved before DiRICH mass production