

Sensitivity Optimization of the Standard Beam Current Monitors for XFEL and FLASH II



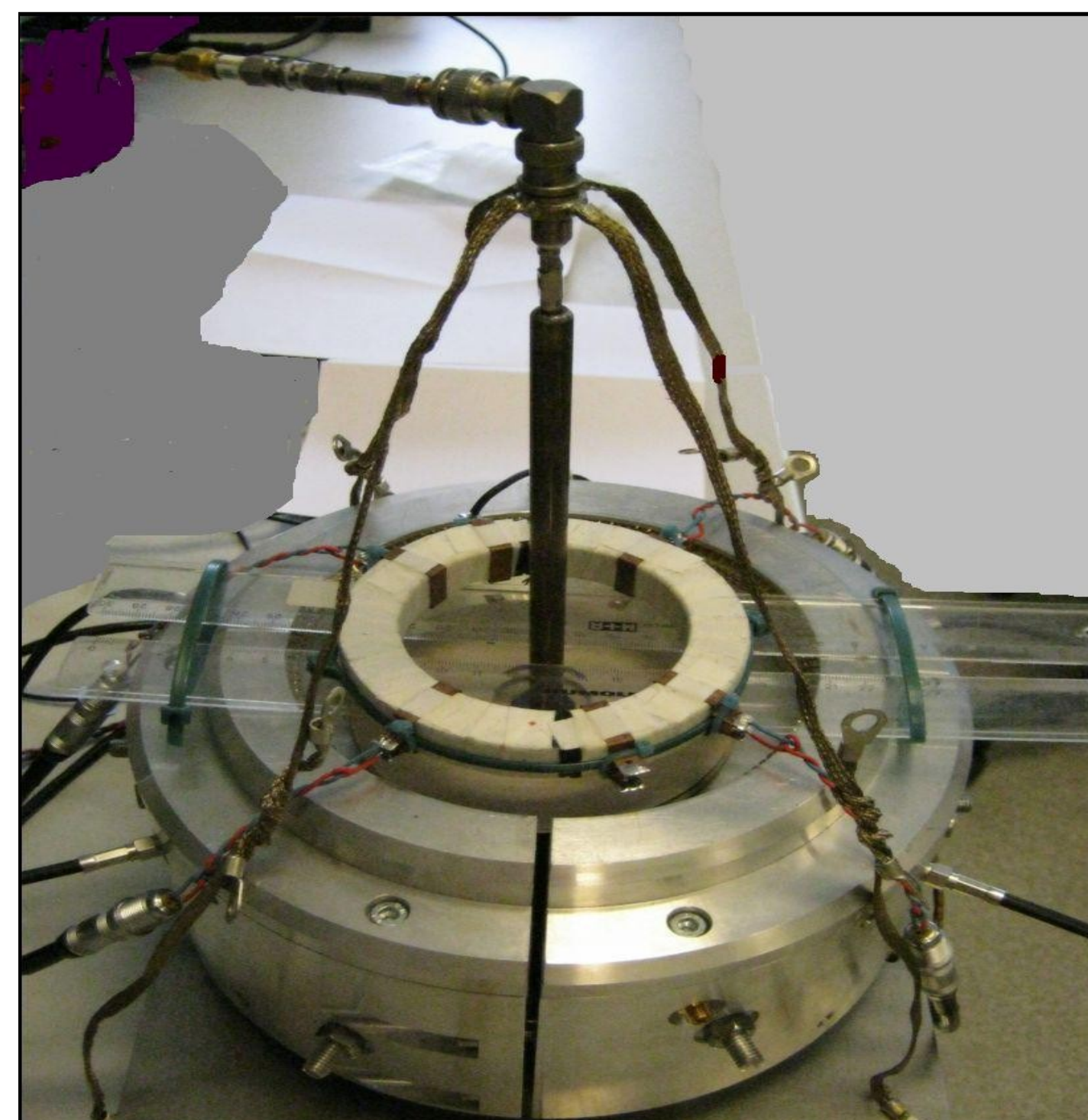
M. Werner, R. Neumann, J. Lund-Nielsen, N. Wentowski (DESY, Hamburg, Germany)

General

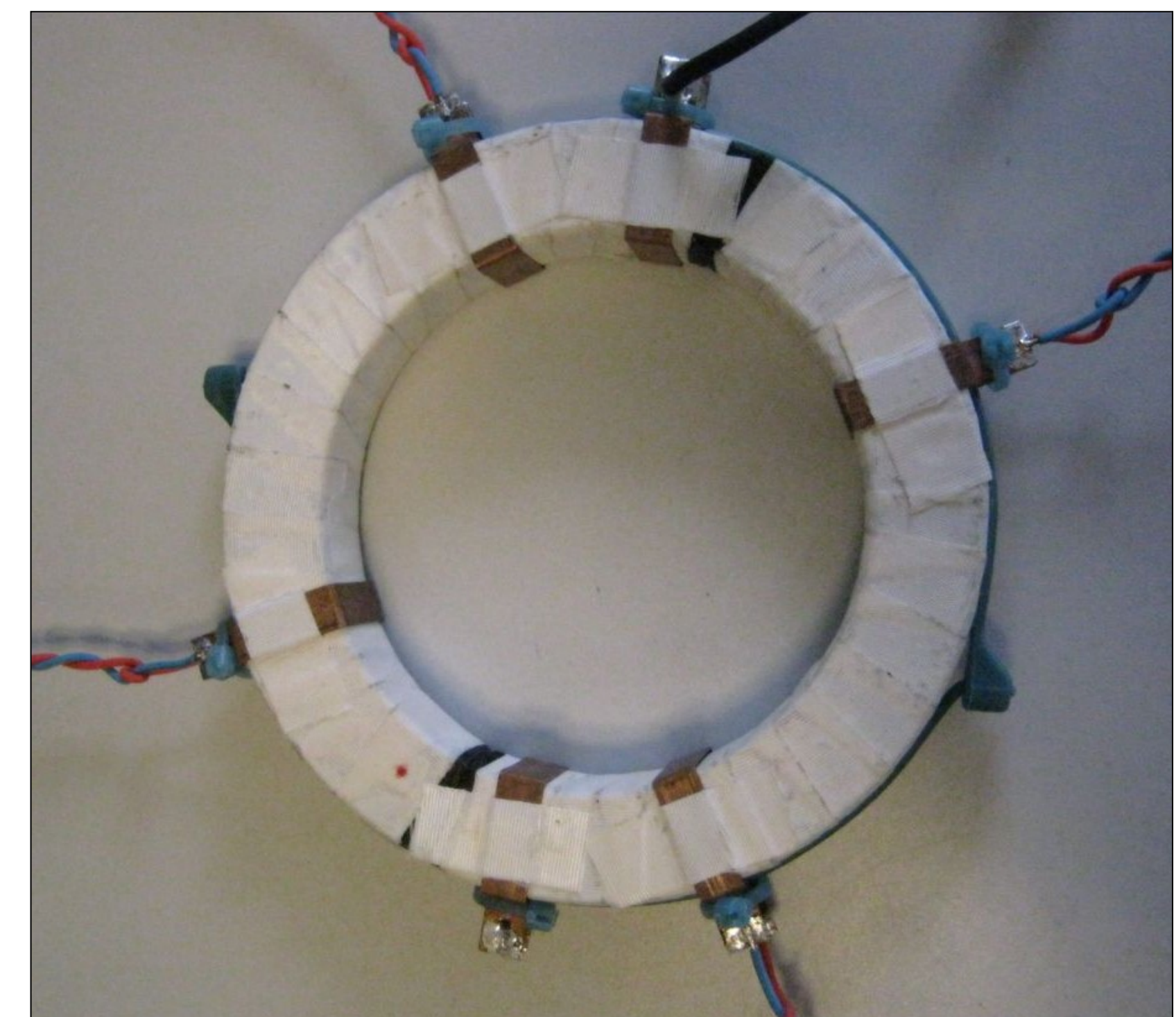
Project goal:

Improve the resolution of our Fast Current Transformers from 2-3 pC RMS to <1 pC RMS

Test setup in the lab

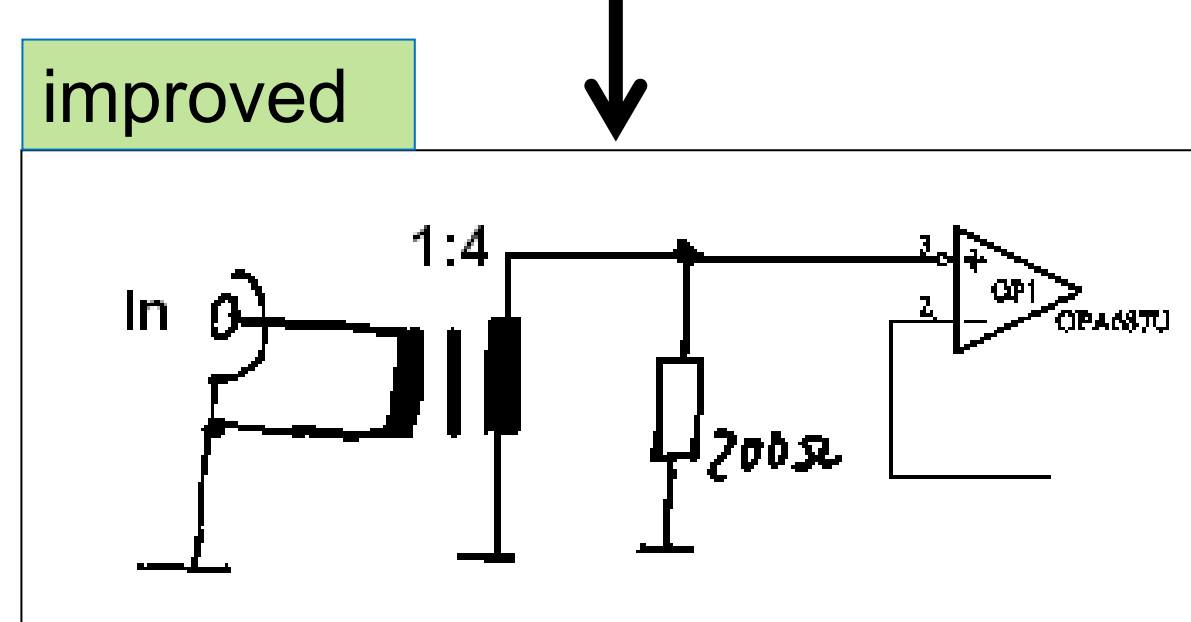
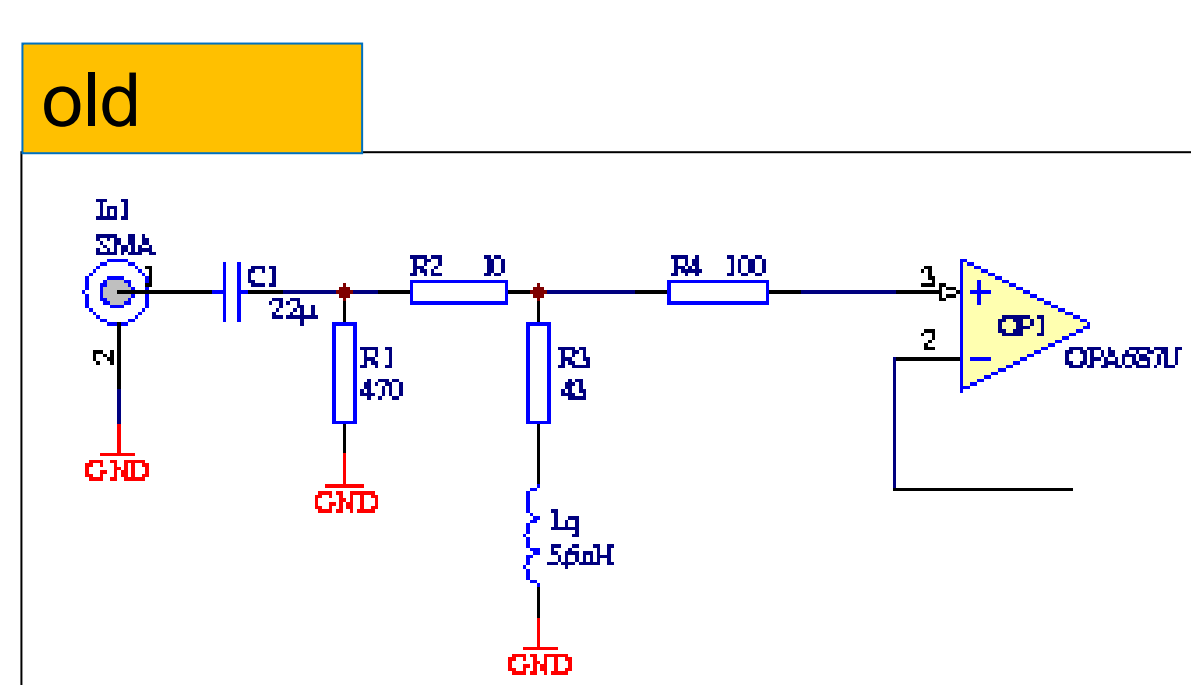


Toroid core with 4 pickup coils and 2 test coils



Improvements

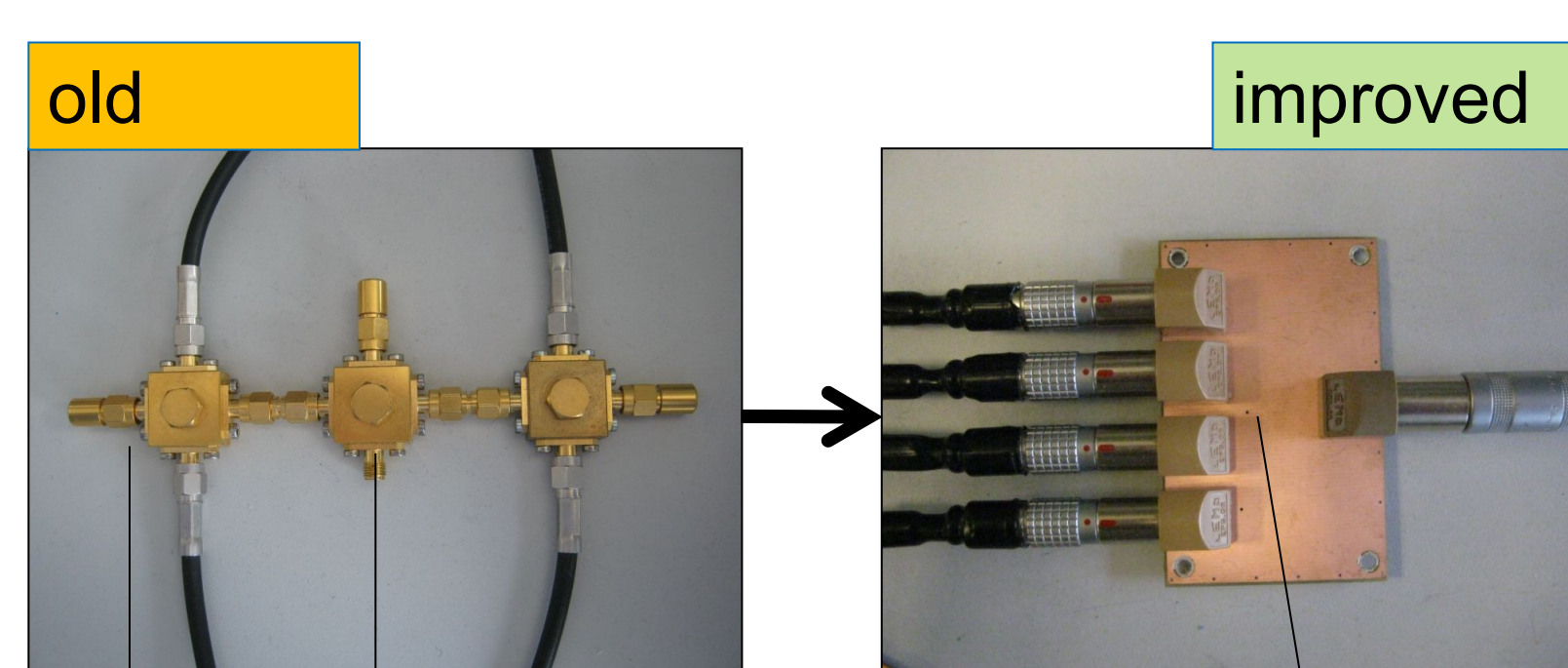
Amplifier



- Matching network removed
- Transformer added

+ 9 dB

Signal combiner



50Ω

output

coaxial

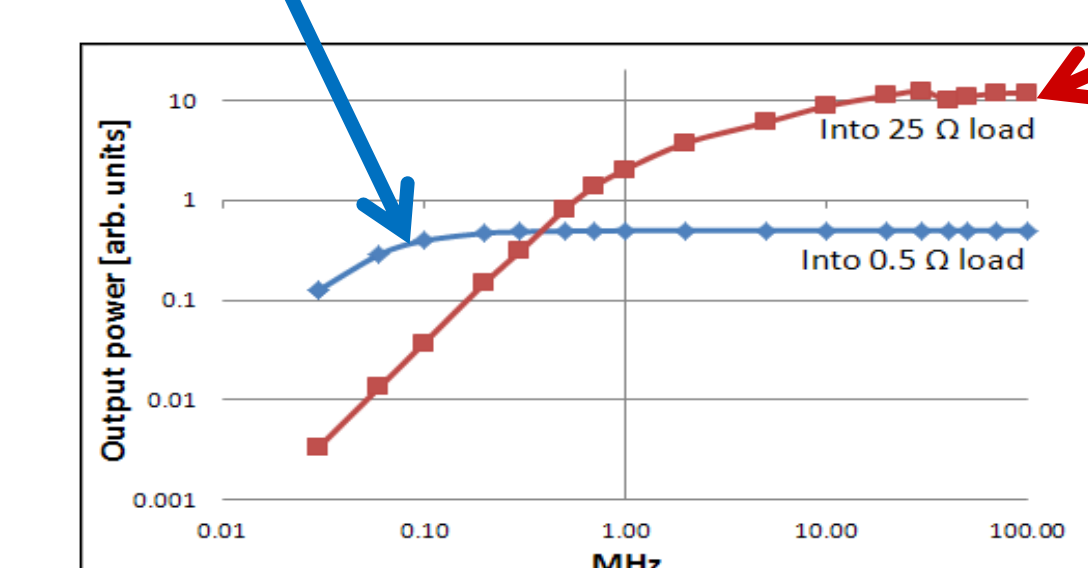
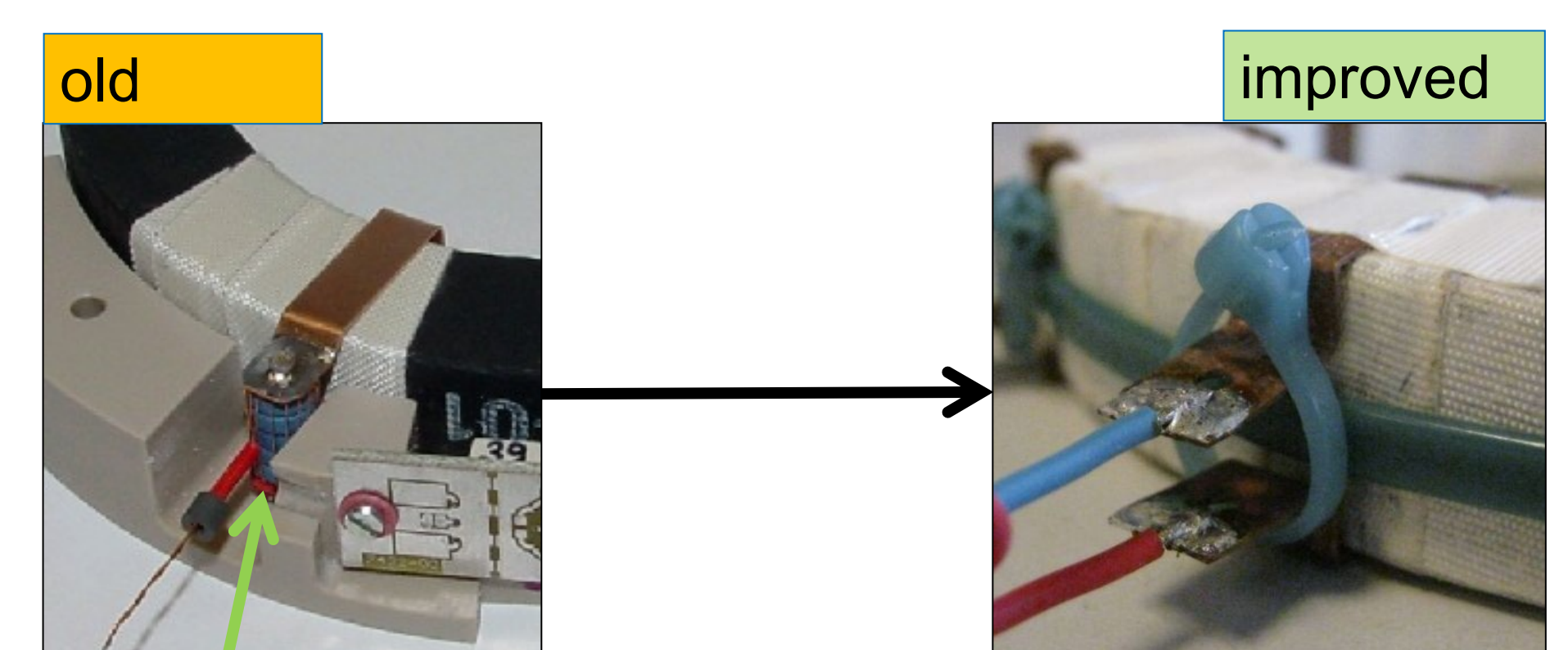
The signals from the 4 coils are connected in parallel

Twisted pair

- 50Ω-Terminations removed
- Change from coaxial to twisted pair

+ 6 dB

Impedance matching

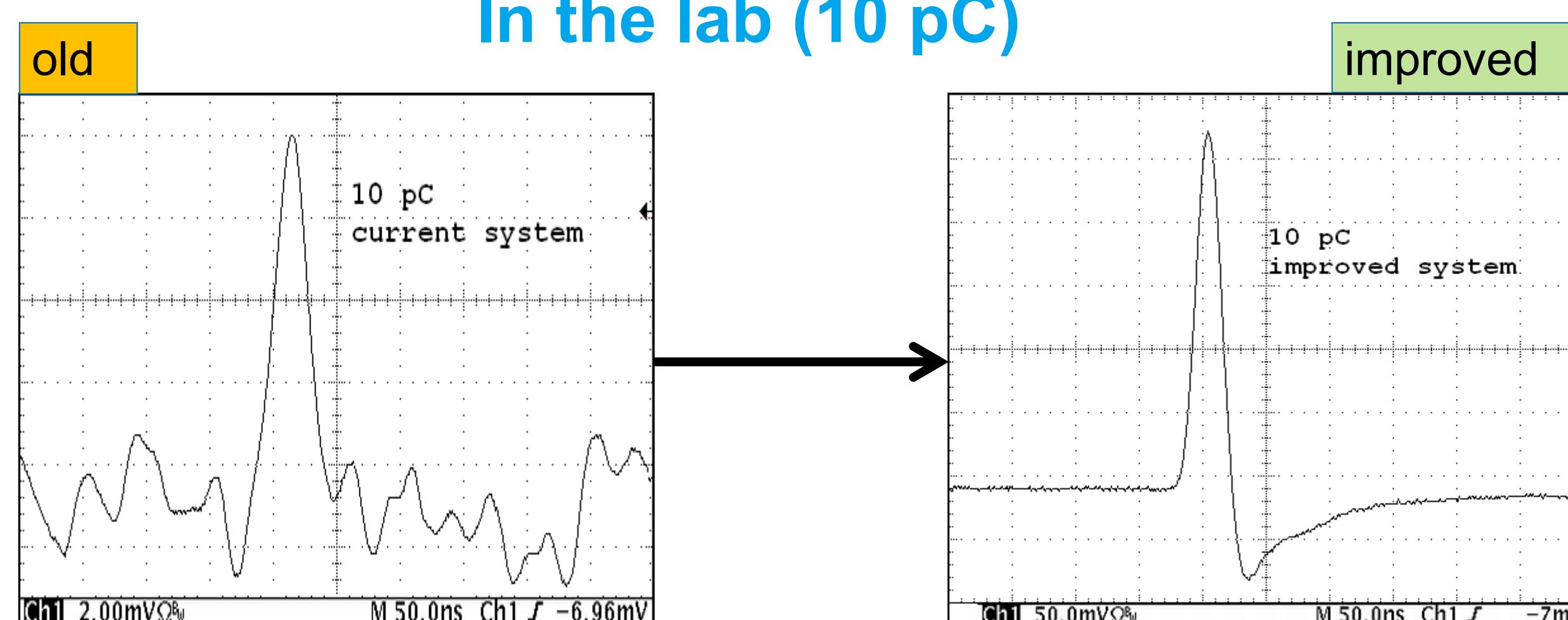


- Transformers removed

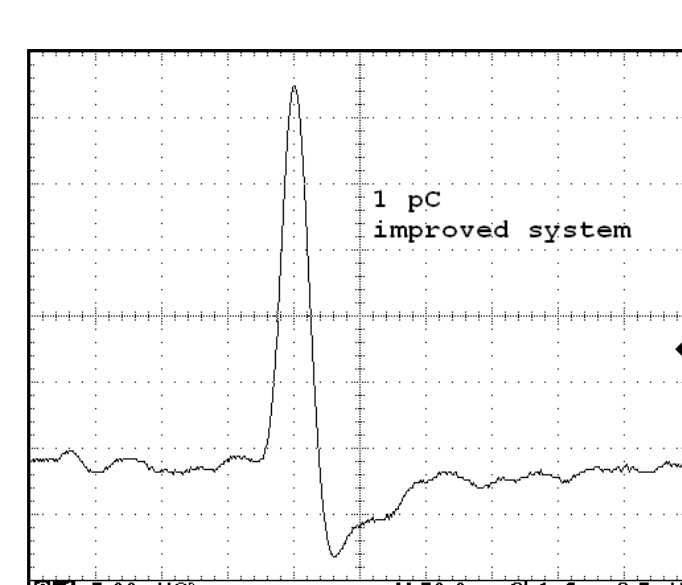
+ 20 dB

Test results in the lab and in the accelerator

In the lab (10 pC)

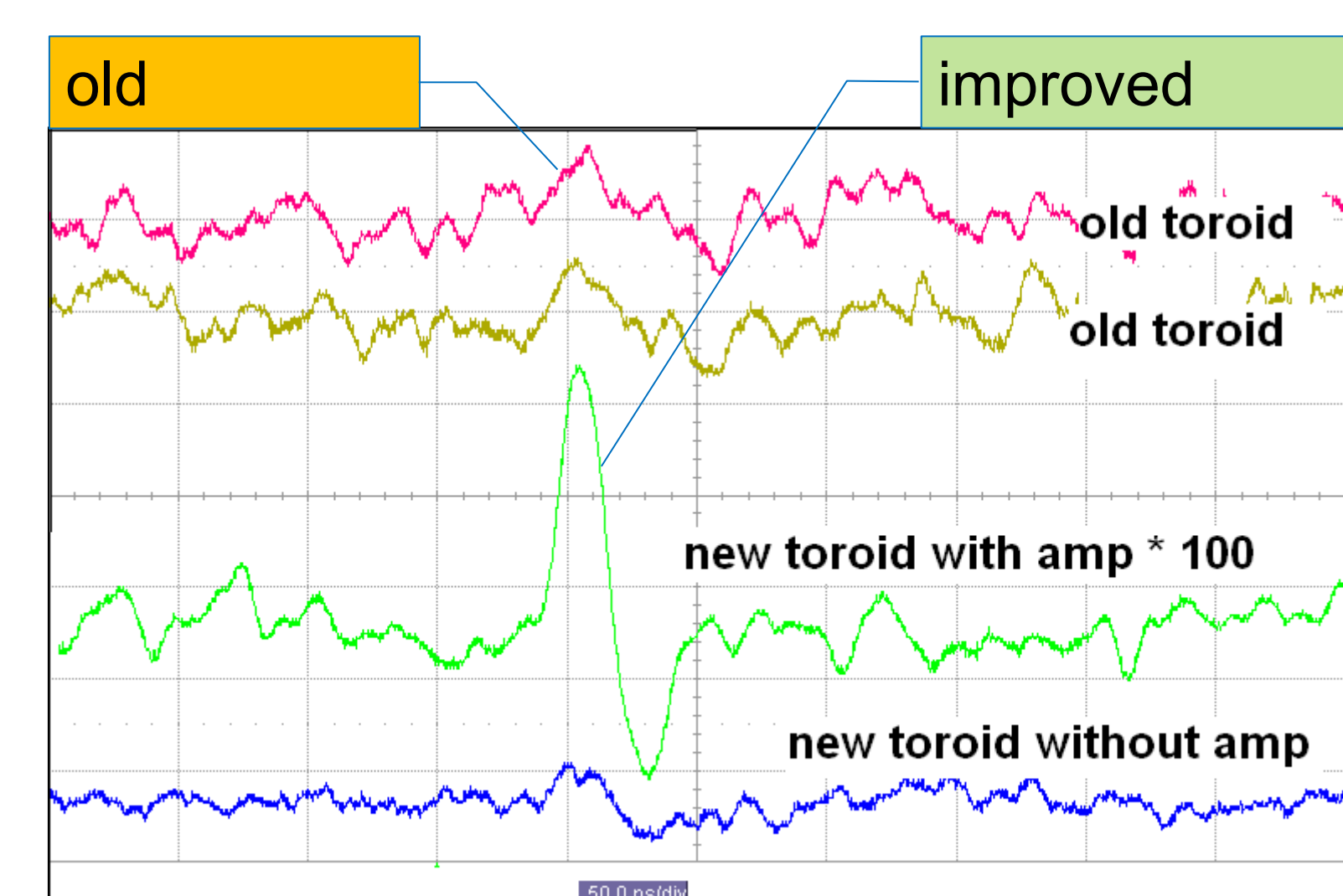


In the lab (1 pC)



We achieved a resolution of **< 0.02 pC RMS** in the lab.

In FLASH (8 pC bunch)



Resolution in FLASH: **0.5 pC RMS** (not better due to EMI).