

Fertigung eines 1m² Neutronendetektor

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Technikum
Elektronik
Geesthacht, 5.10.2021

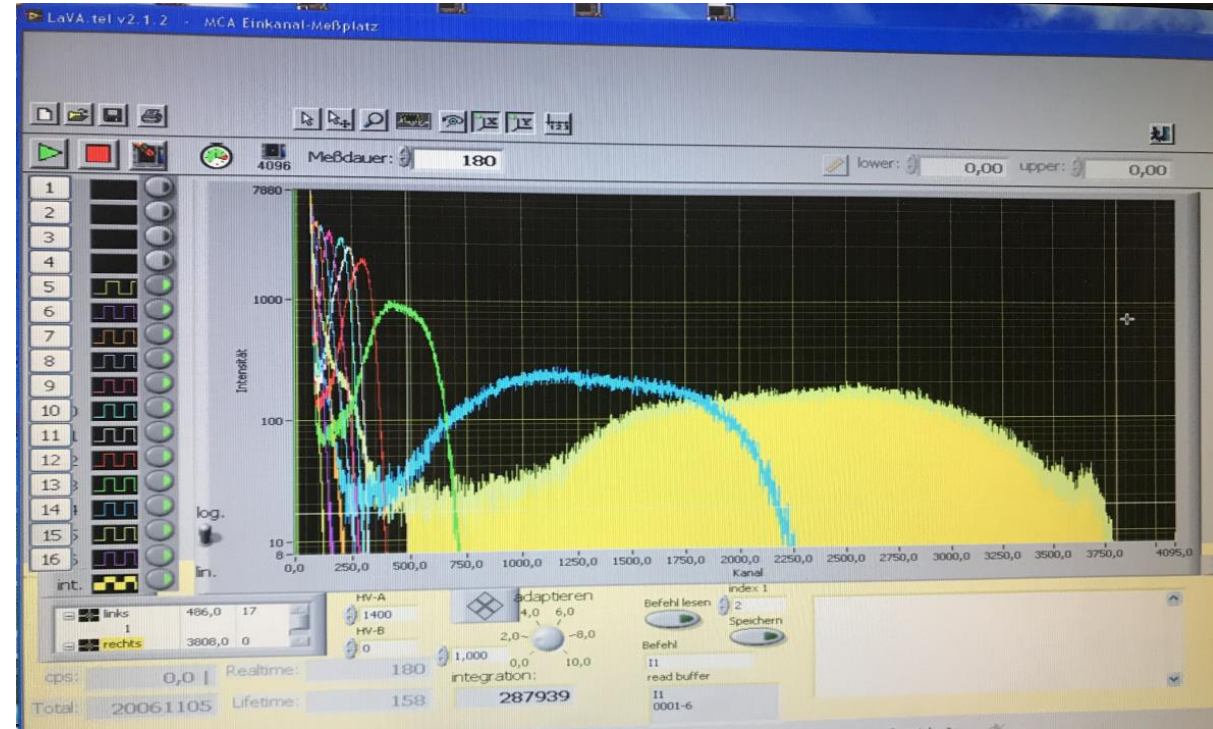
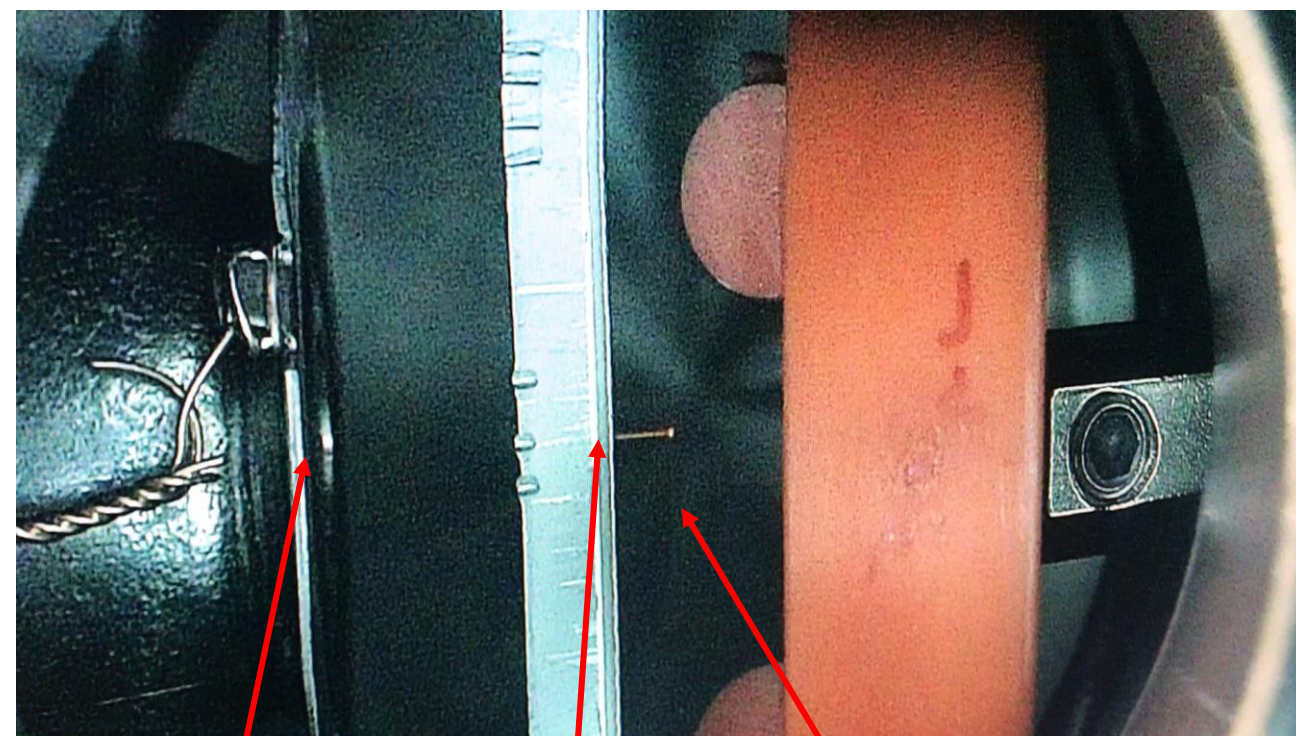


Helmholtz-Zentrum
hereon

Voranalysen

Testzelle

- Test optimaler Abstand Draht zur besputterten Fläche
- Test optimale Gasmischung
- Test optimaler Gasdruck
- Test optimale Drahtstärke
- Test Hochspannung



Quelle

Lochblende(GND)

Draht (HV)

Puls-Höhen-Spektren
Testmessungen

Modulfertigung

- Rahmen
- Converter Blech
- Kleber



70t Presse

Modulfertigung

- Kleben von Bor-besputterten Blechen auf Alu-Rahmen



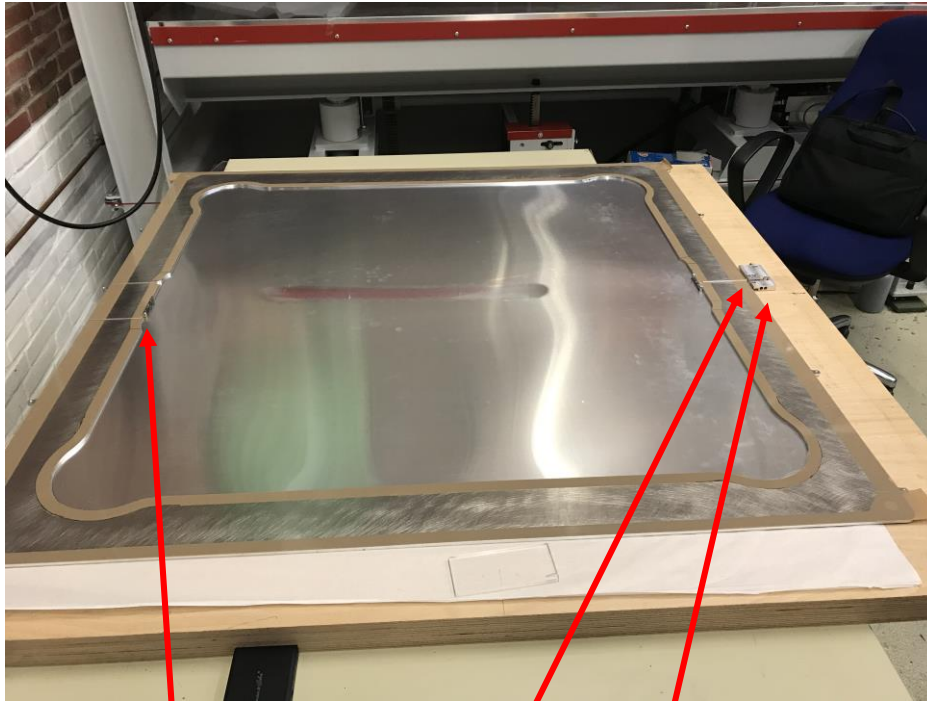
1. Versuche (Wellig)



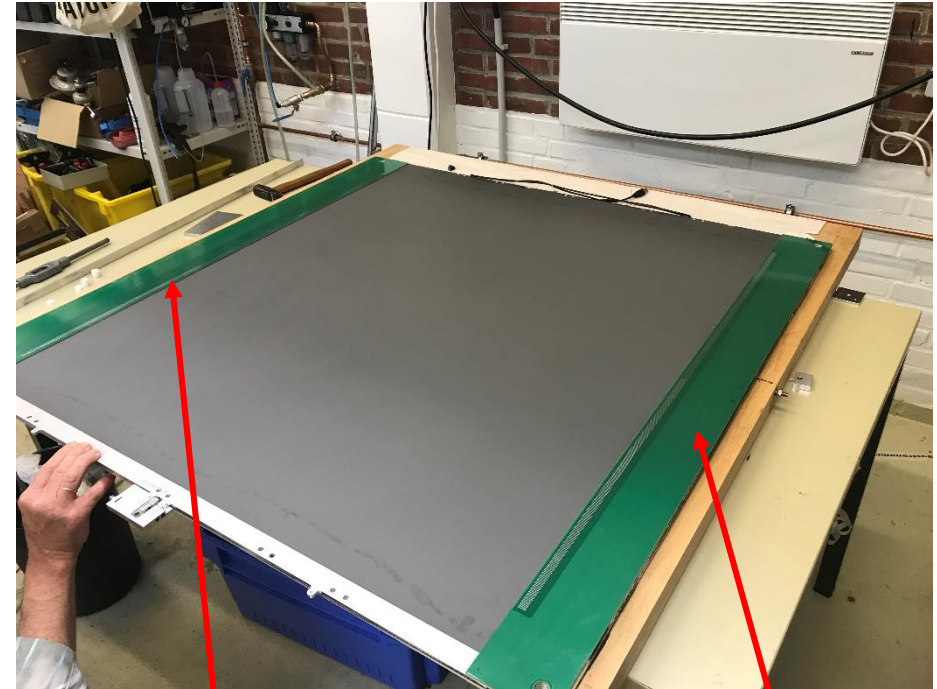
Prozess optimiert (glatt)

Modulfertigung

- Zwei Halbrahmen mit Converterblech zu einem Modul zusammen kleben
- Aufkleben von Delay-Line sowie Ankerplatine beidseitig



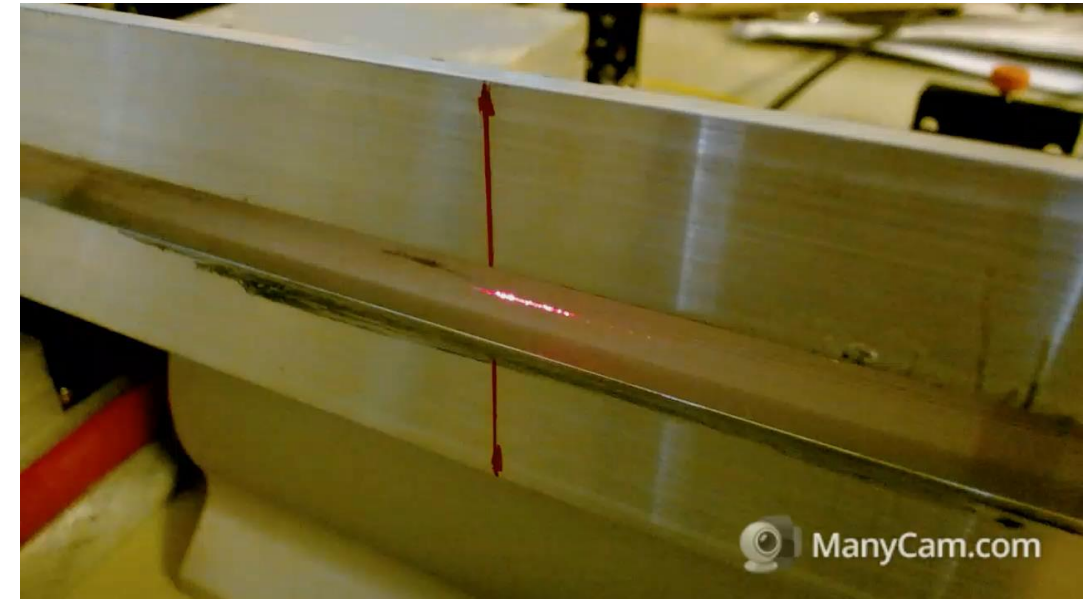
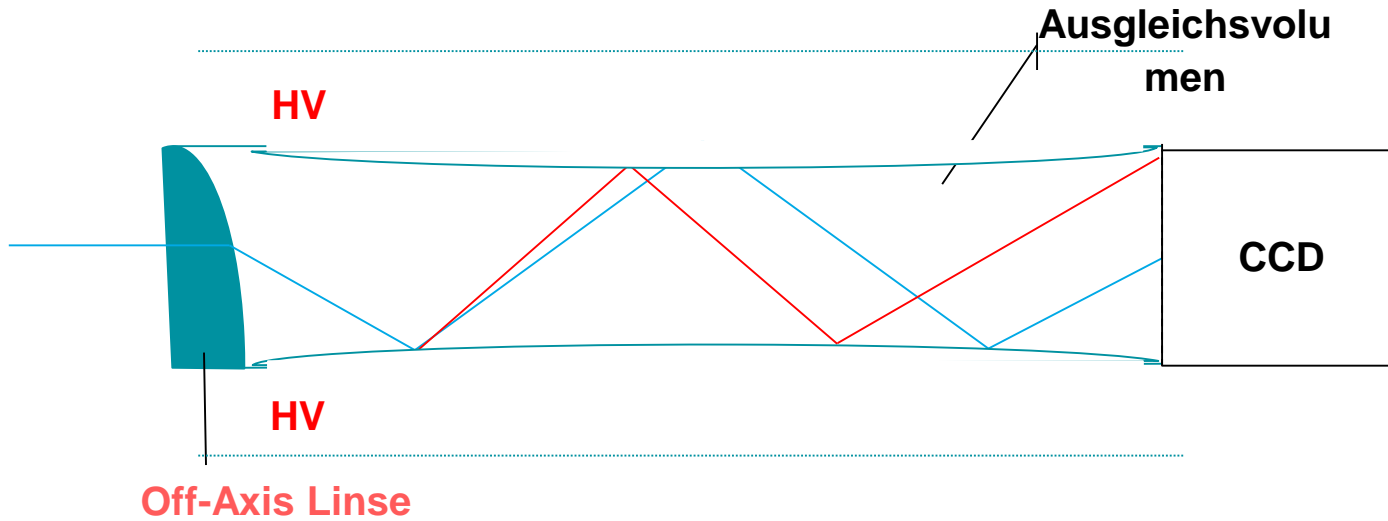
USB-Kamera Laser Gaseinlass



Delay-Line (500 Taps) Ankerplatine

Modulfertigung

Optische Parallelitätskontrolle



Modulfertigung

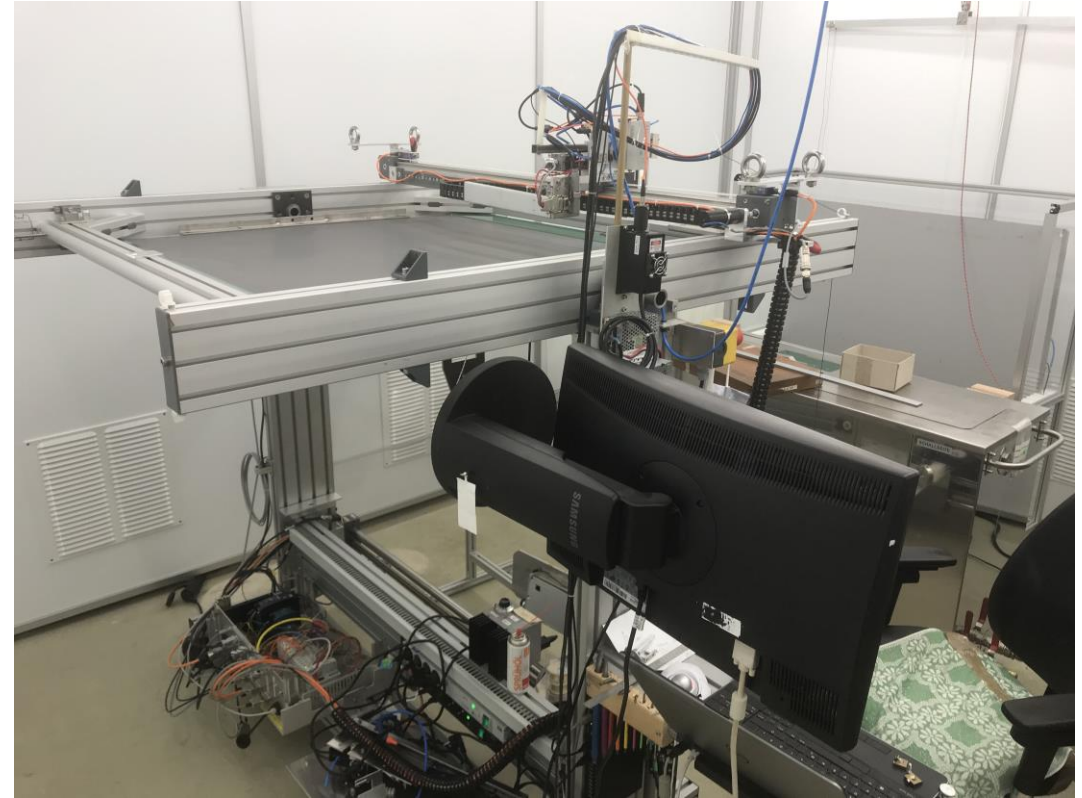
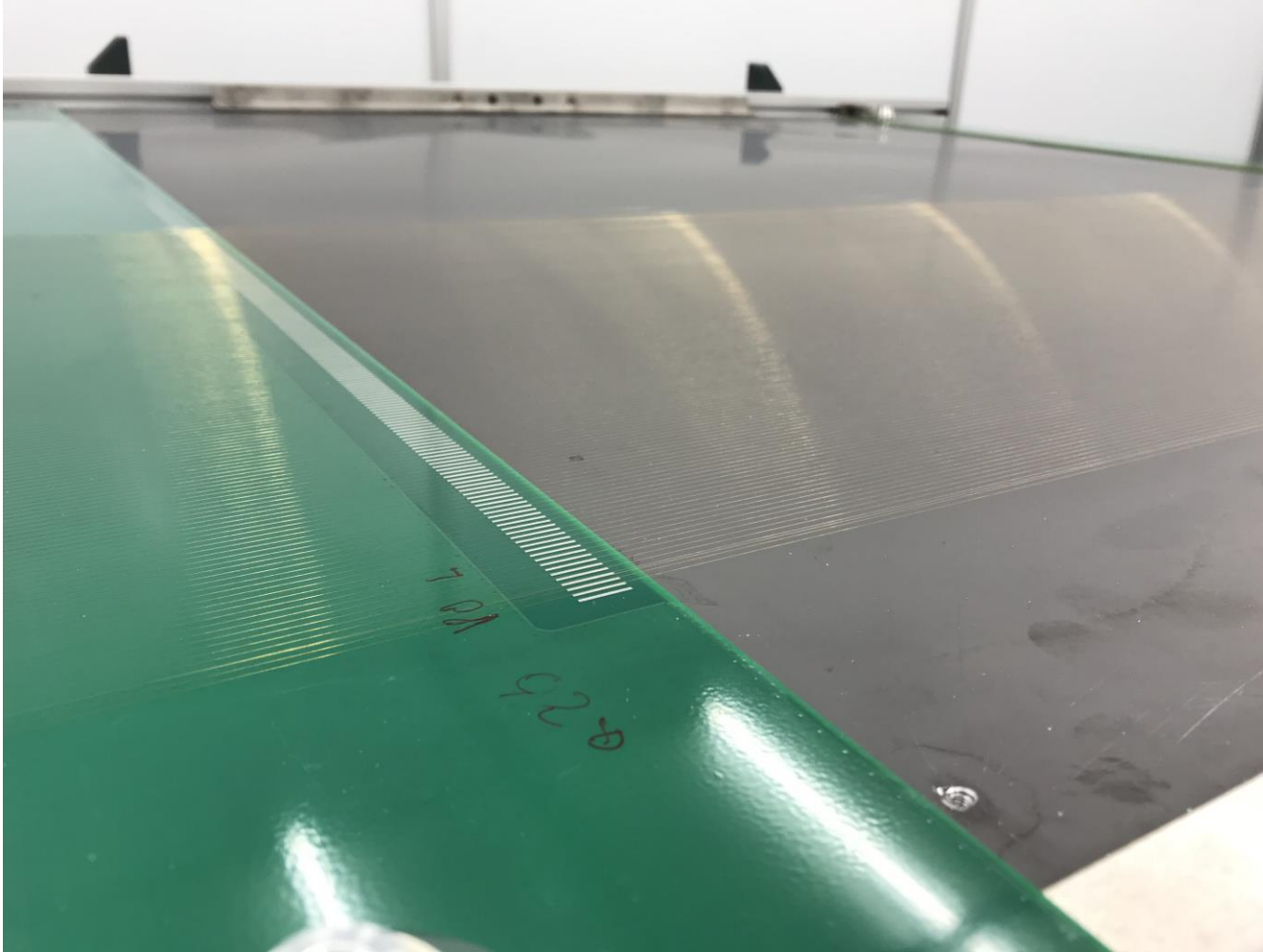
- Wickeln



- 2 Halbmodule/Durchgang
- 25 μ m Wolframdraht Gold beschichtet
- Einstellbare Zugspannung ca. 1N
- Sicherungslötung

Modulfertigung

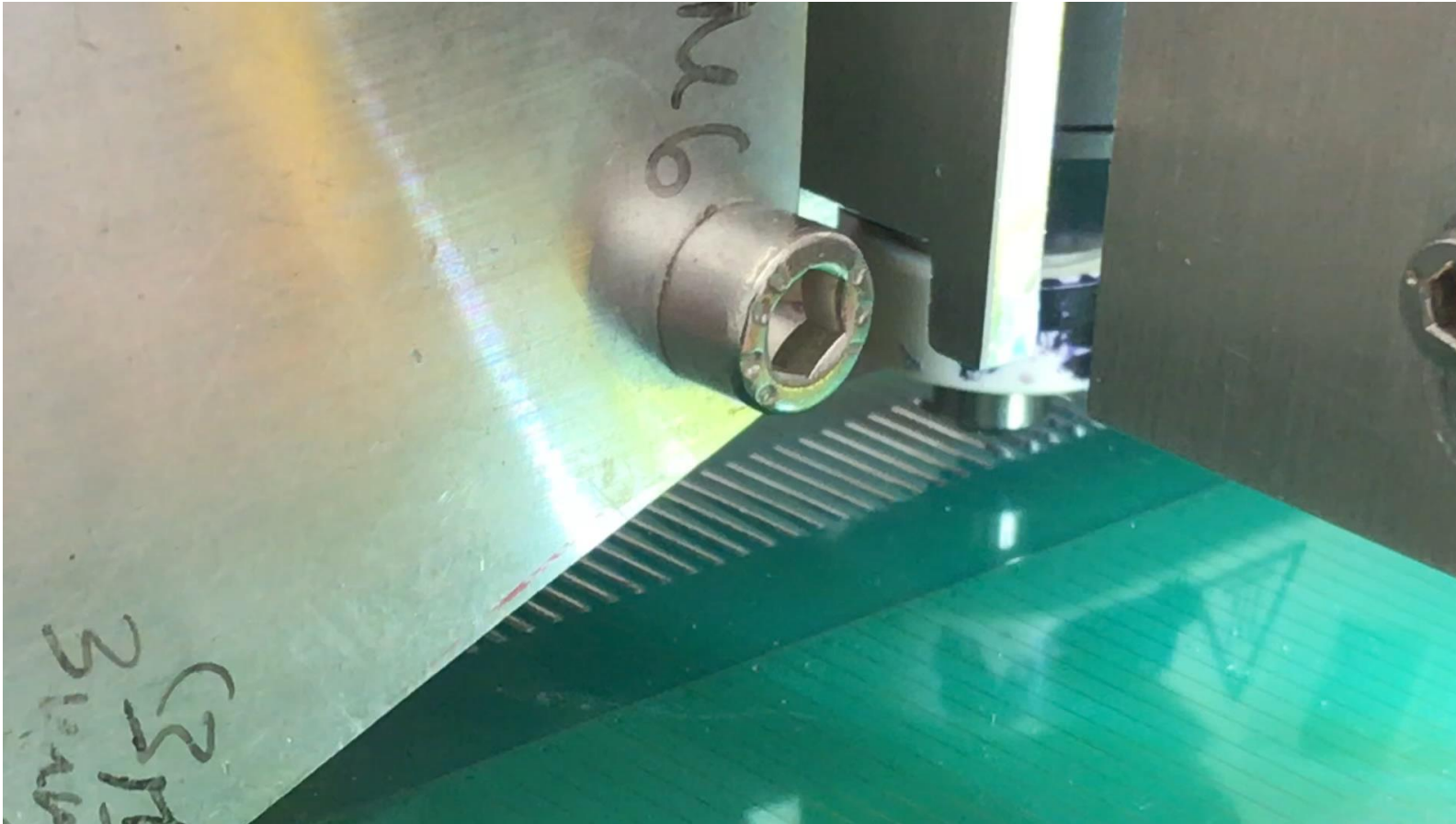
- Wickeln



„Wilma“

Modulfertigung

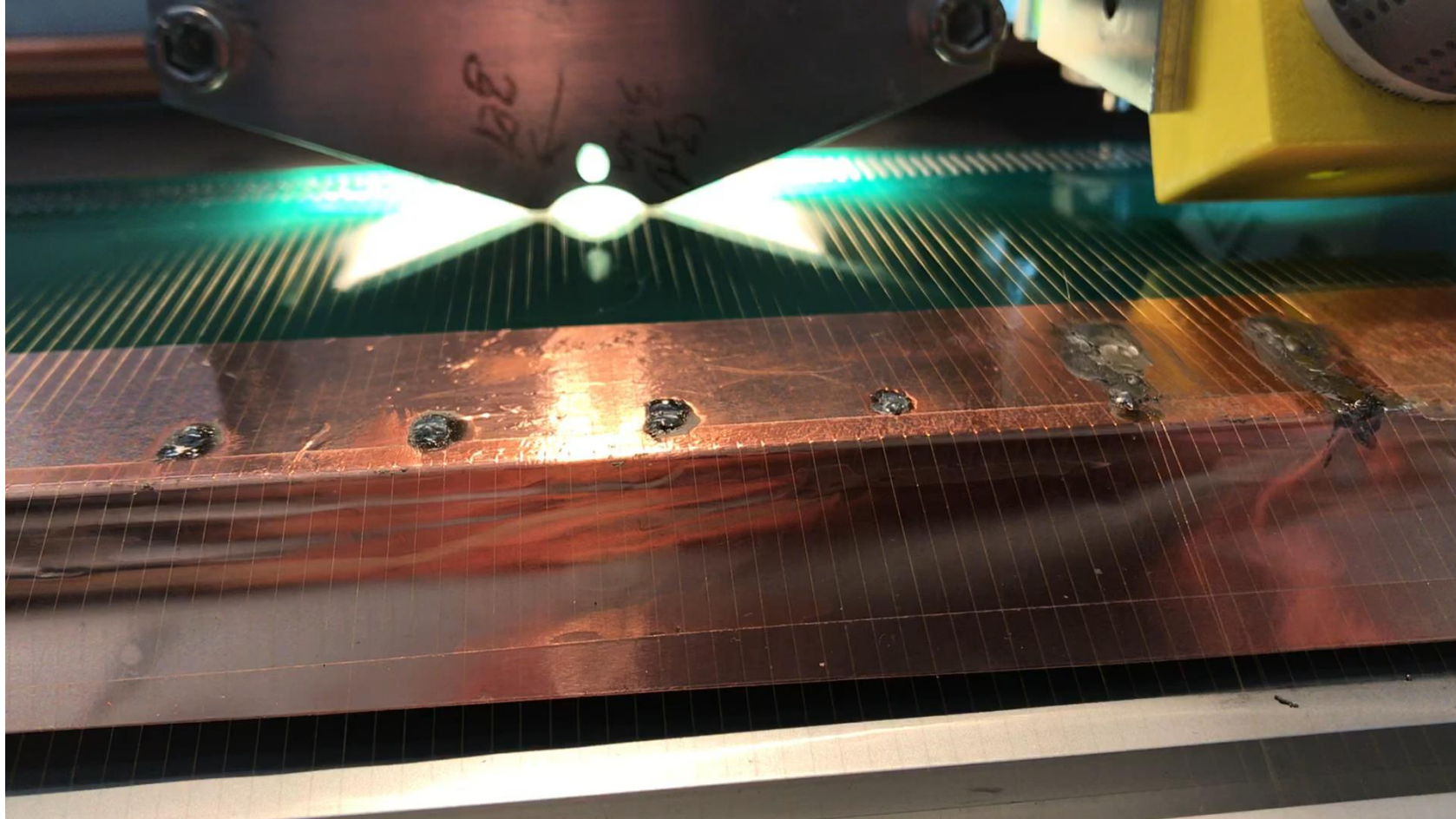
- Dispensen



- Niedrigtemperatur
Lötpaste
- Jet-fähig

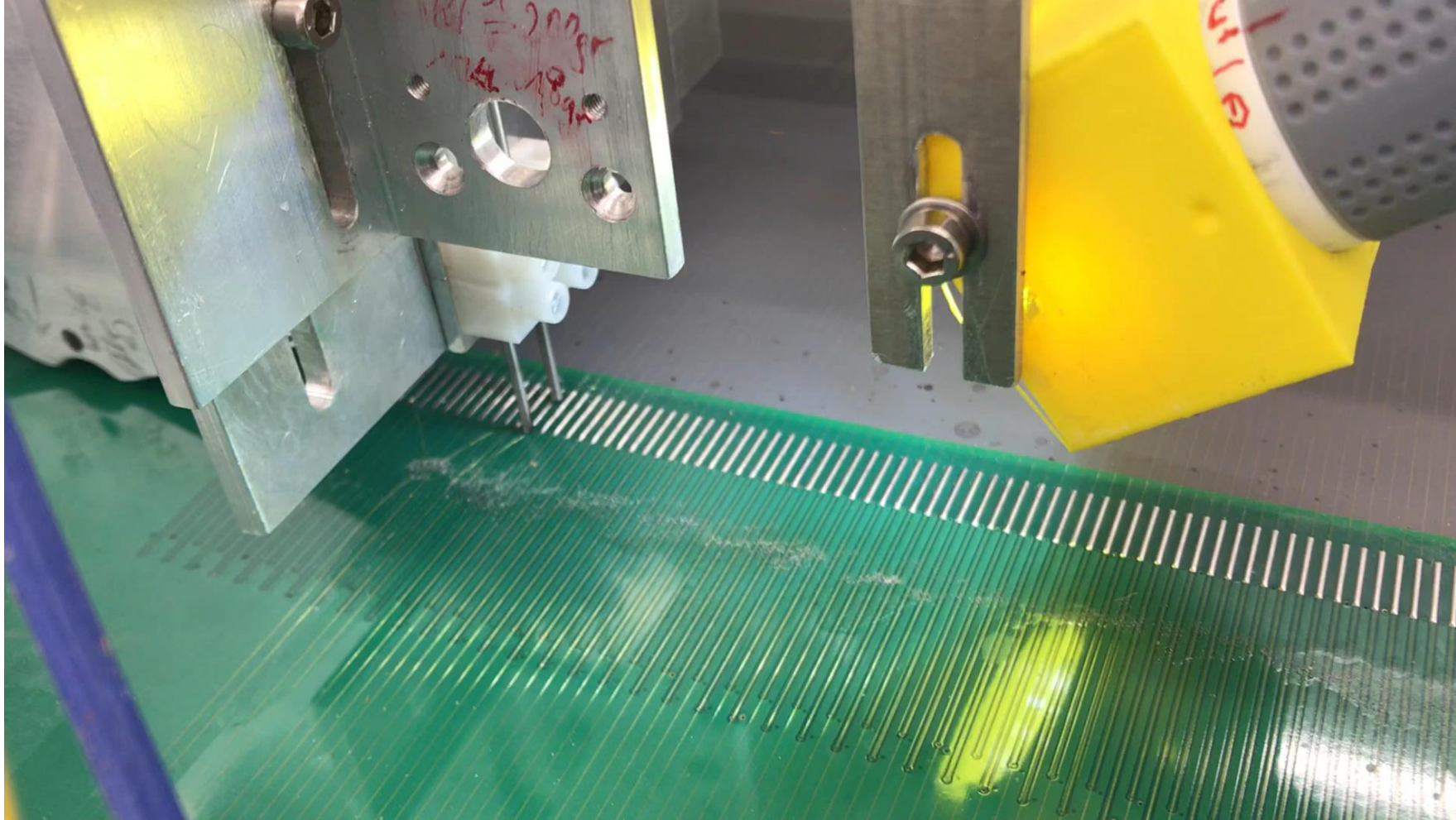
Modulfertigung

- Löten

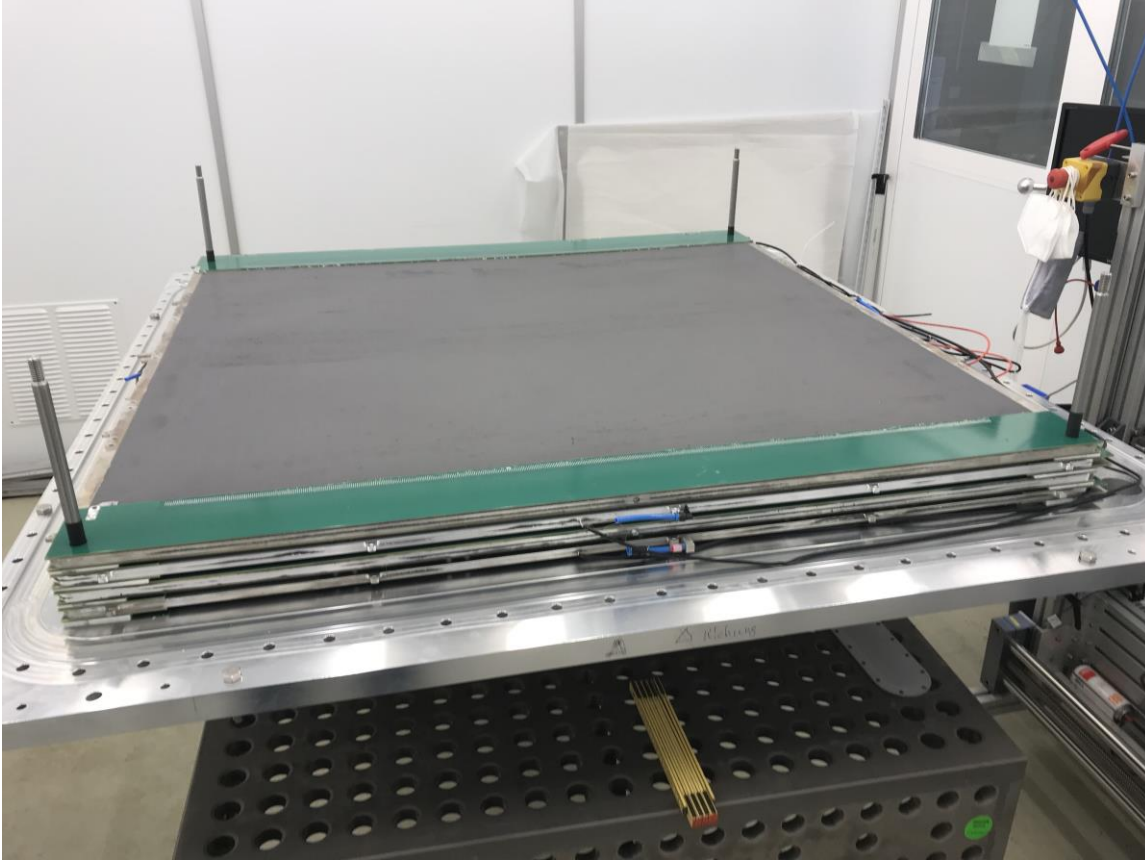


Modulfertigung

- Drähte schneiden



Detektor-Stapel

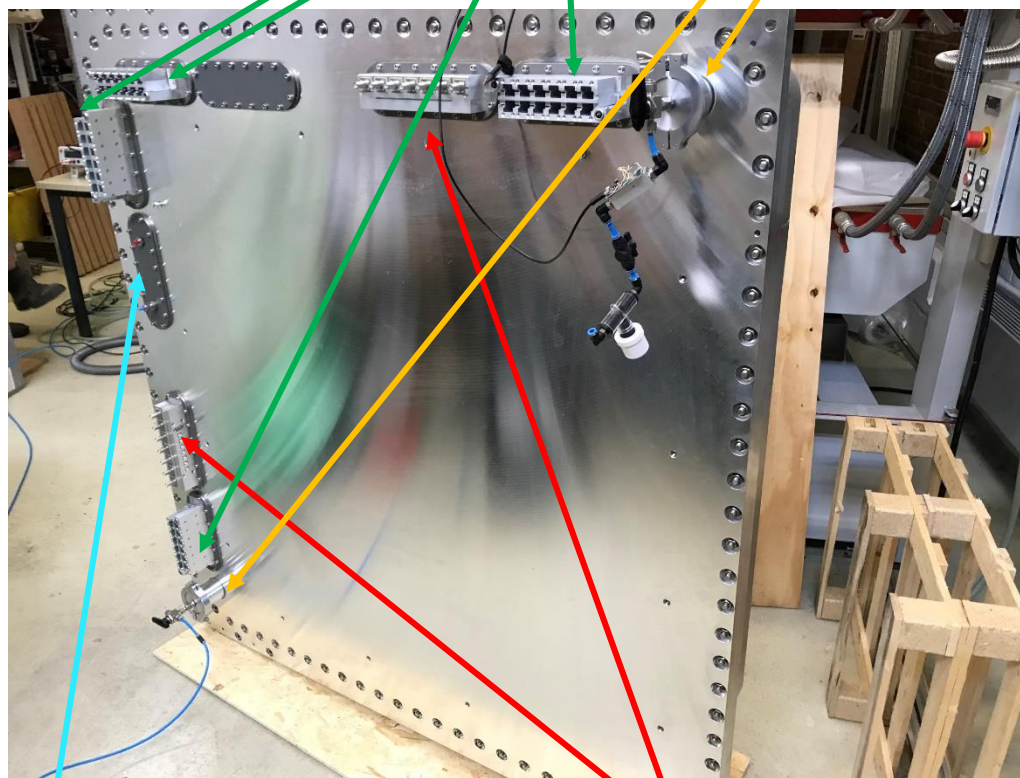


- Bis zu 12 Module
- 24 Converterschichten
- Hochspannung pro Ebene individuell einstellbar
- Druck in jedem Modul einstellbar
- Druck im Gasvolumen einstellbar

Detektor



Flansche für Signale und Preamps
Detektorgas Ein-/Auslass

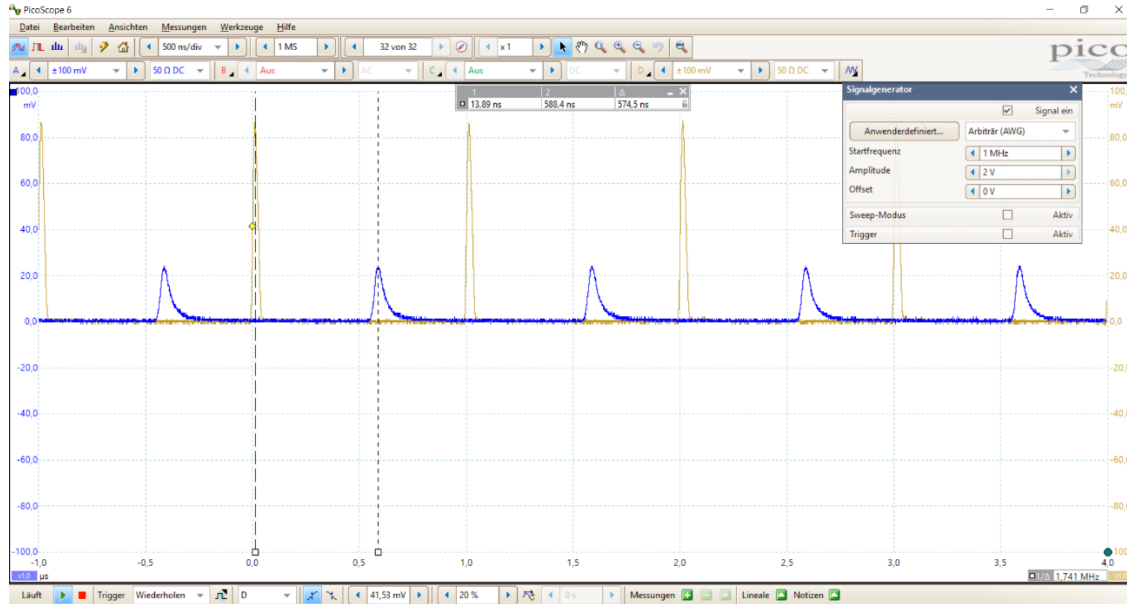


Laser und Anschluß
Ausgleichsvolumen

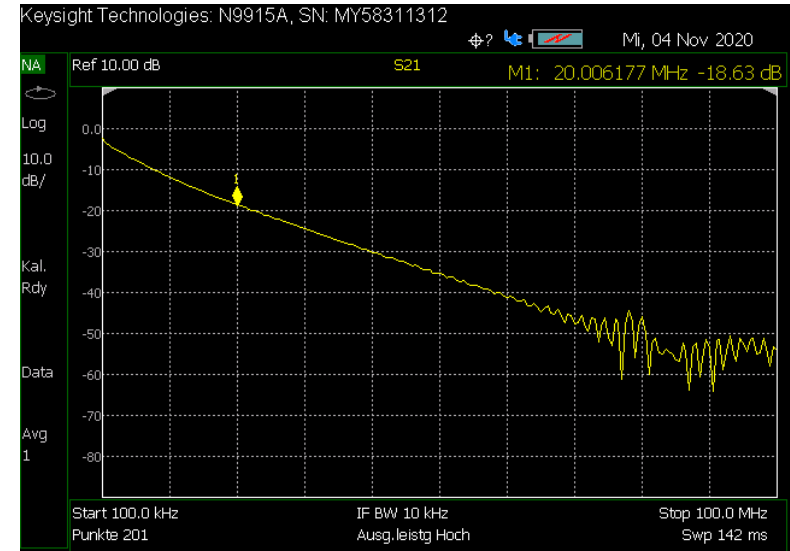
Flansche für HV
und USB (Kamera)



Delay-Line



Delay



Dämpfung

1200mm

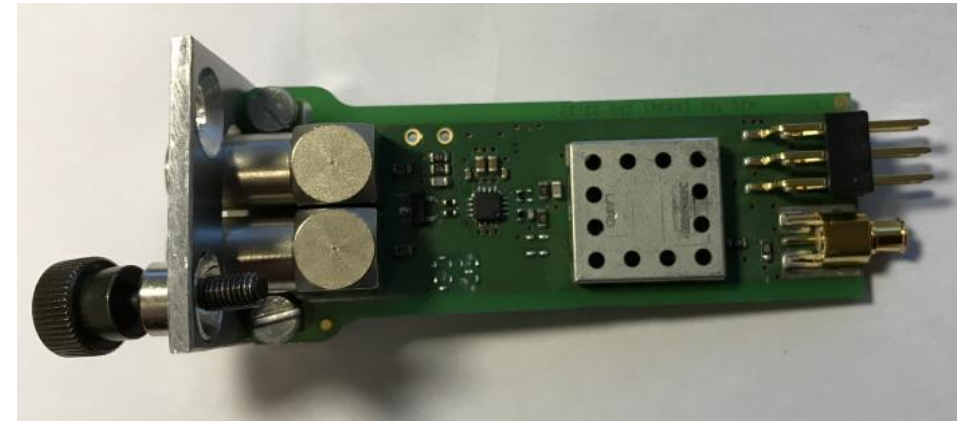


Delay-Line 500 taps ca. 1ns/tap

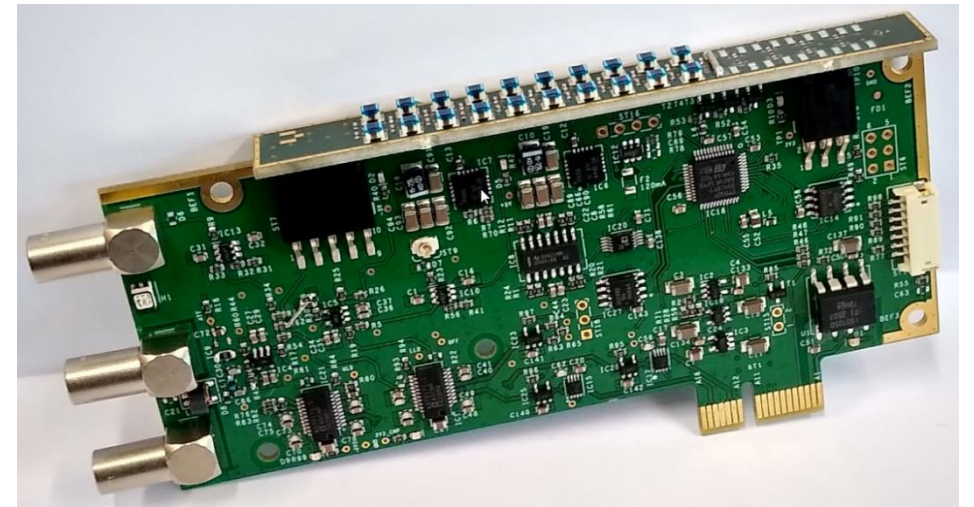
Signale



Pulse

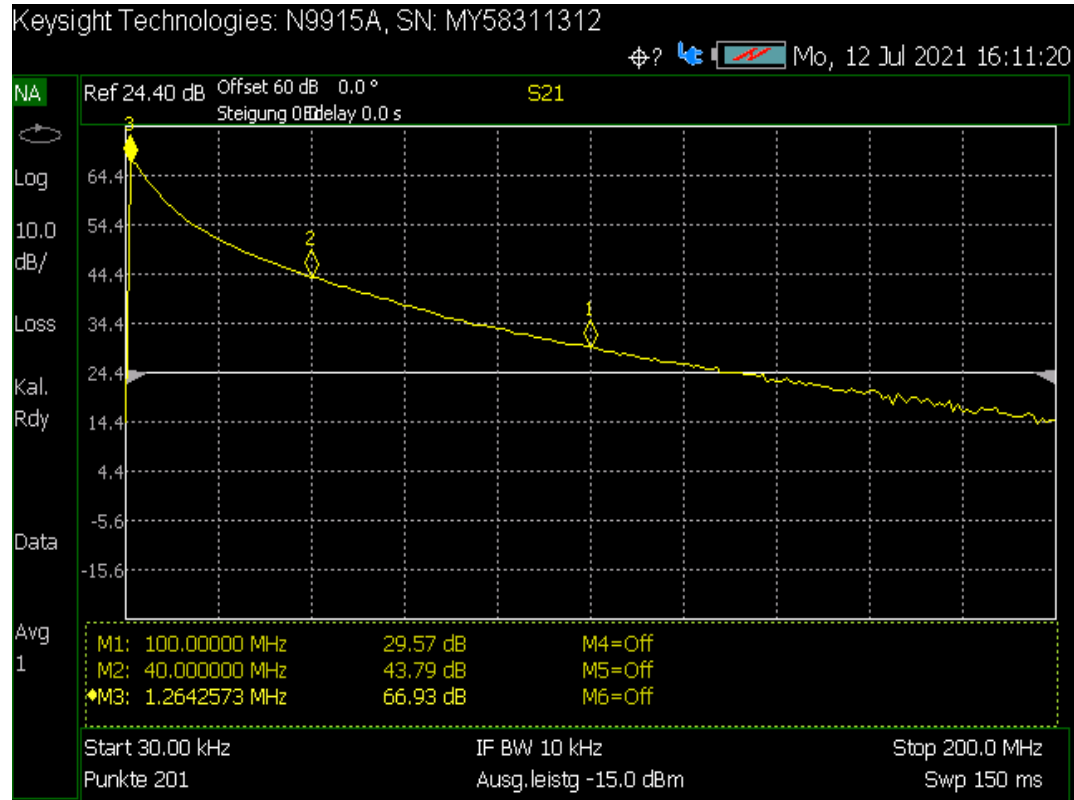


Pre-Amplifier

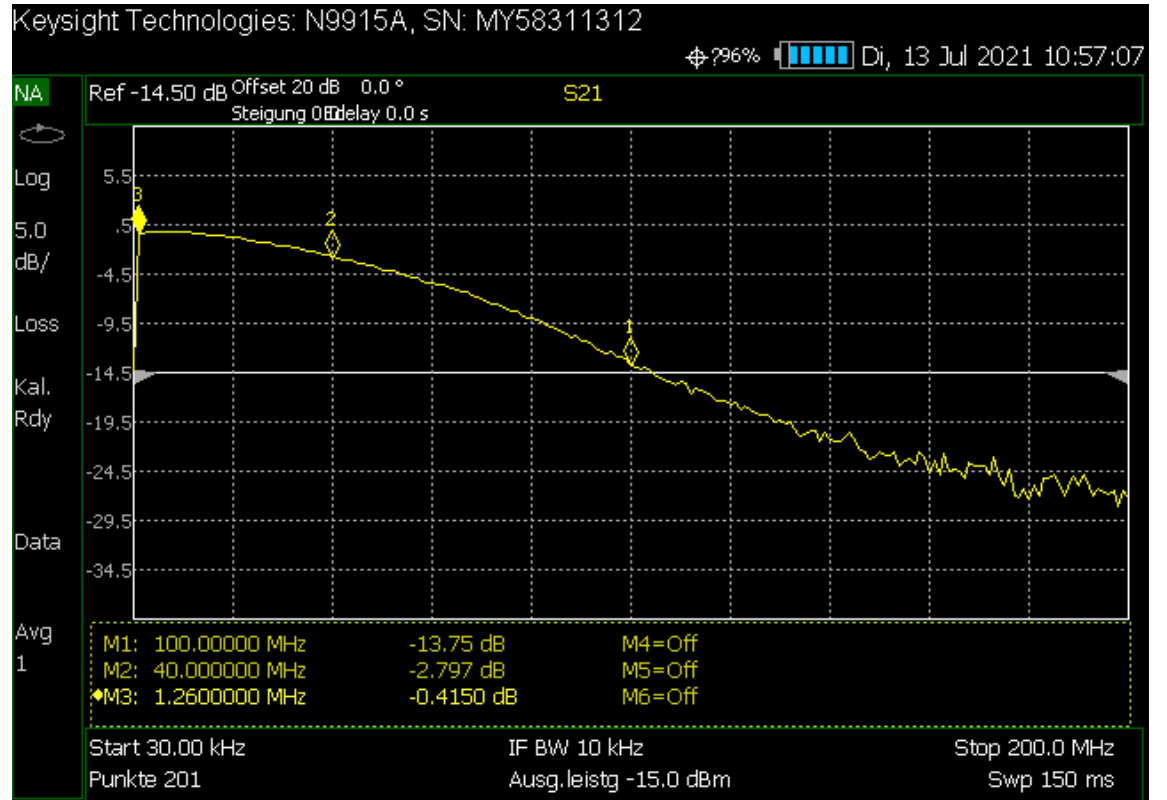


CFD

Signale

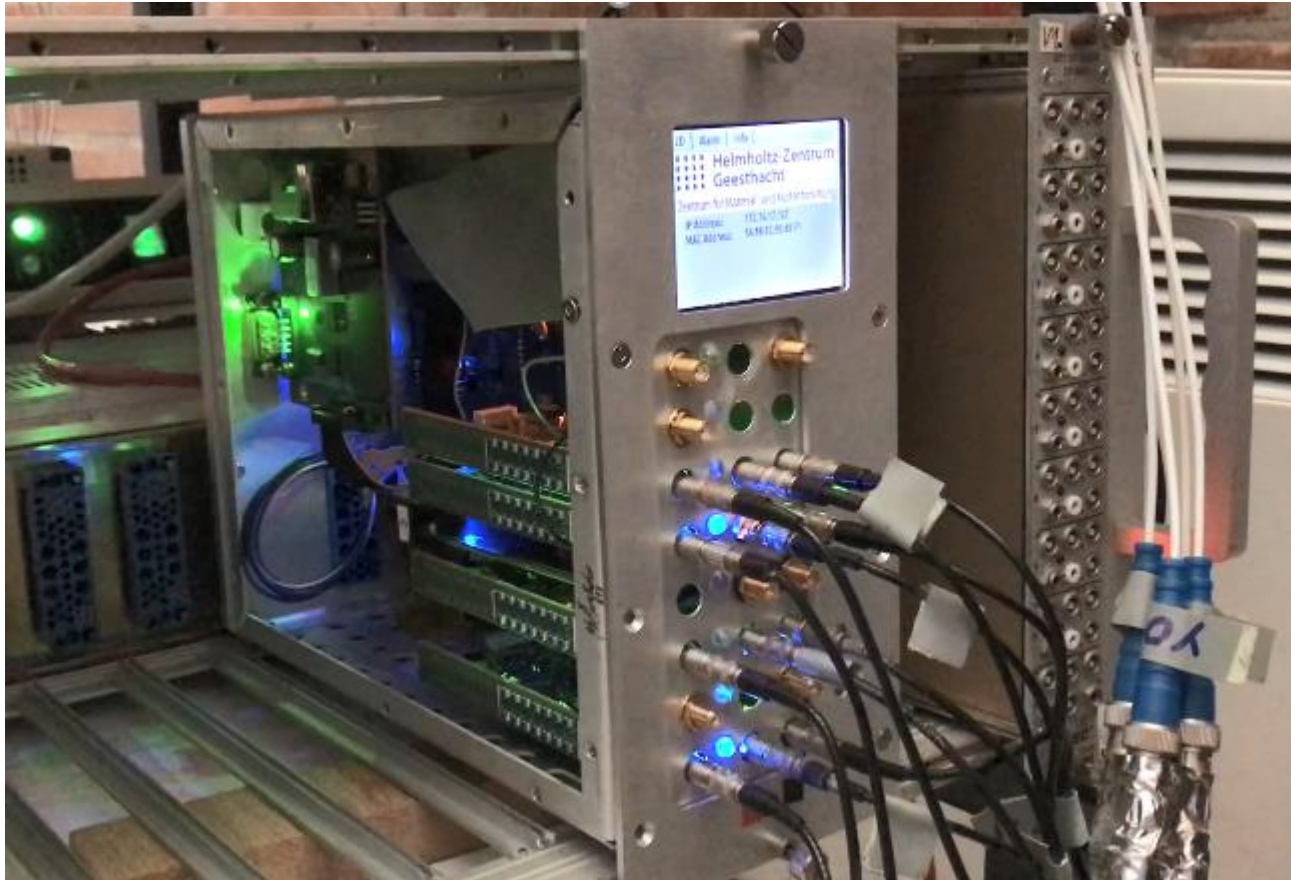


Frequenzgang: Preamp

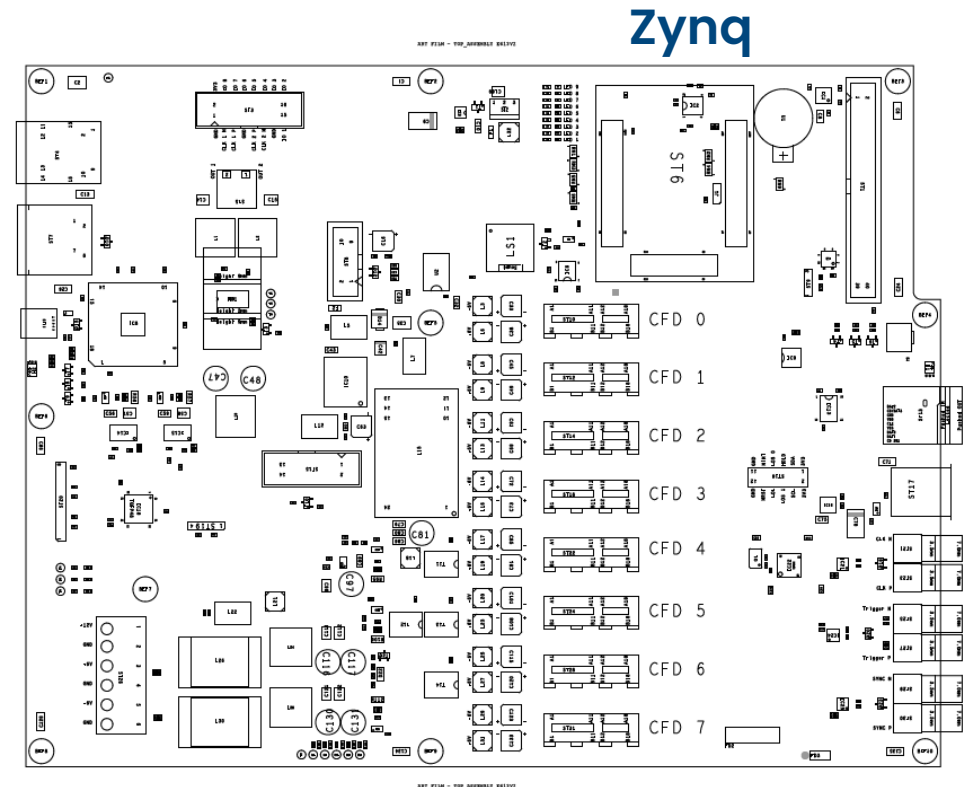


Frequenzgang: CFD

Readout electronic

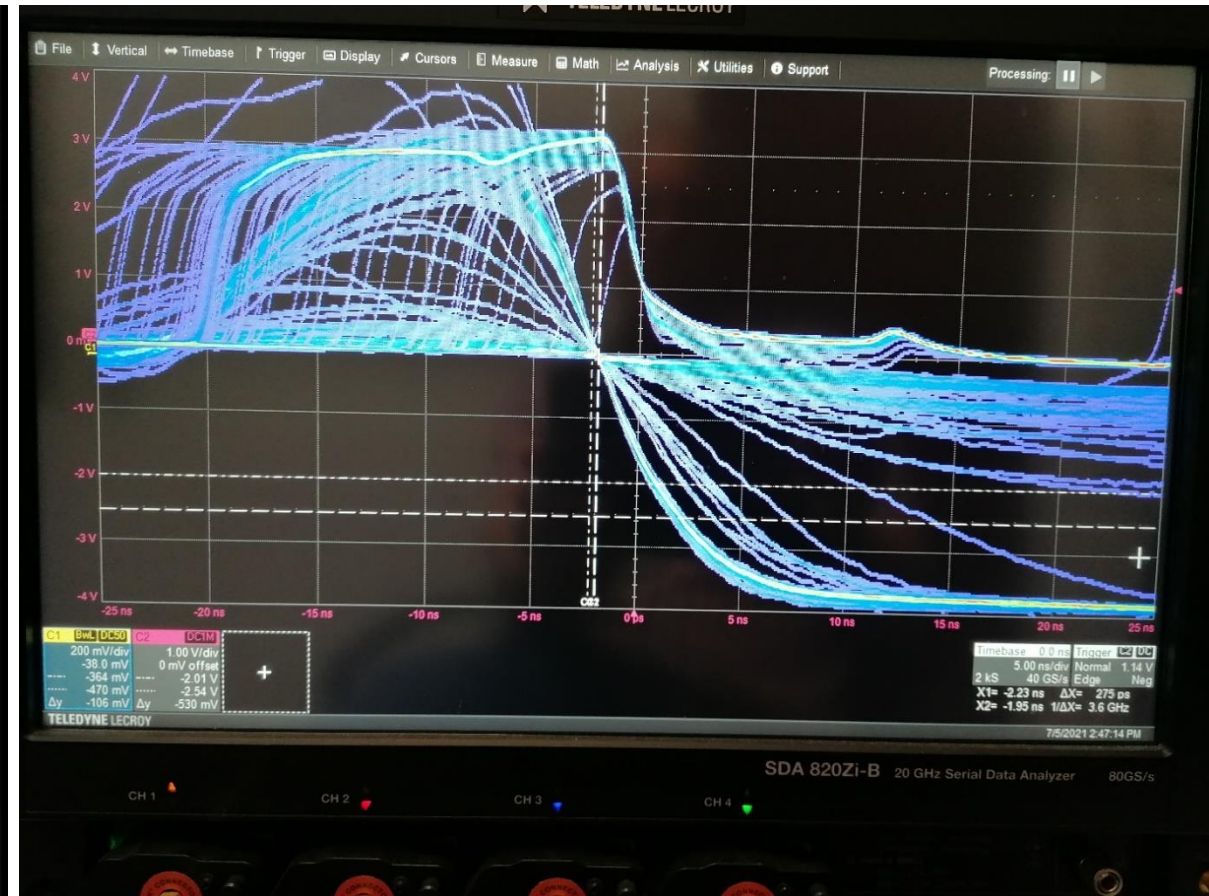


4 CFDs



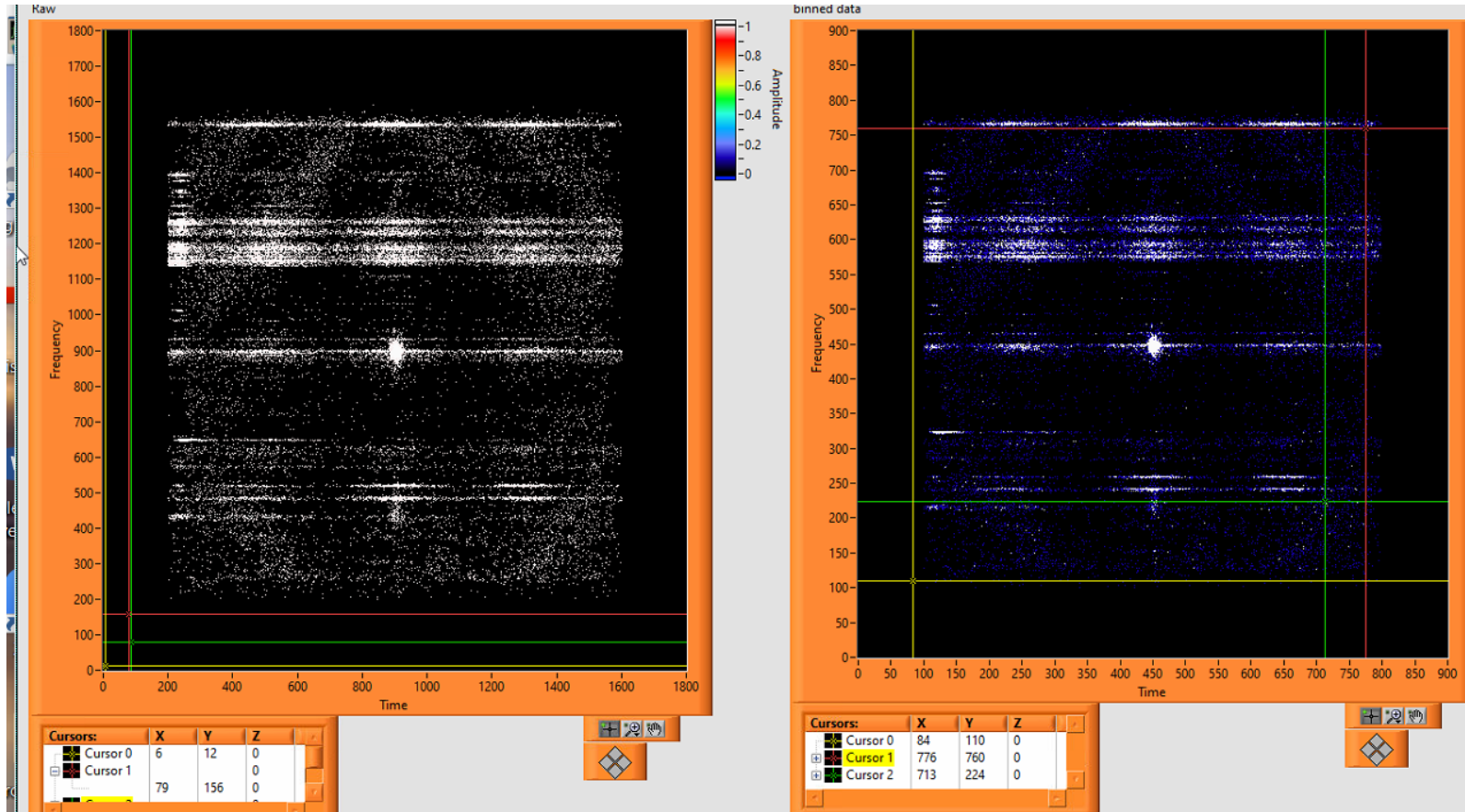
Masterarbeit Christian Jacobsen
Entwicklung einer Multikanal-
Auswertehardware
für Delayline-Neutronendetektoren

Signale

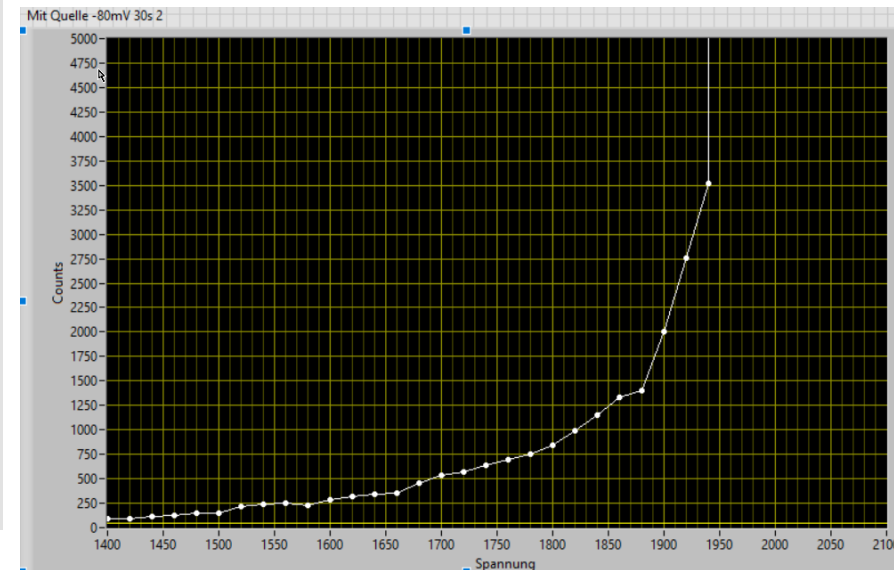
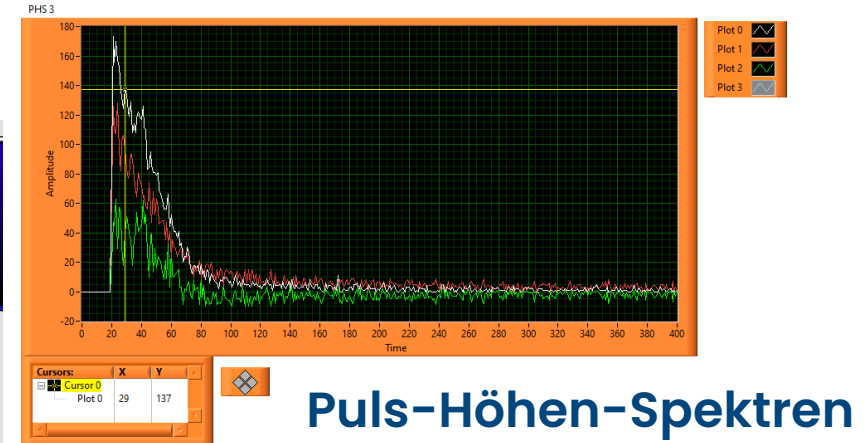


CFD

Erste Messungen



Ortsaufgelöste-Spektren

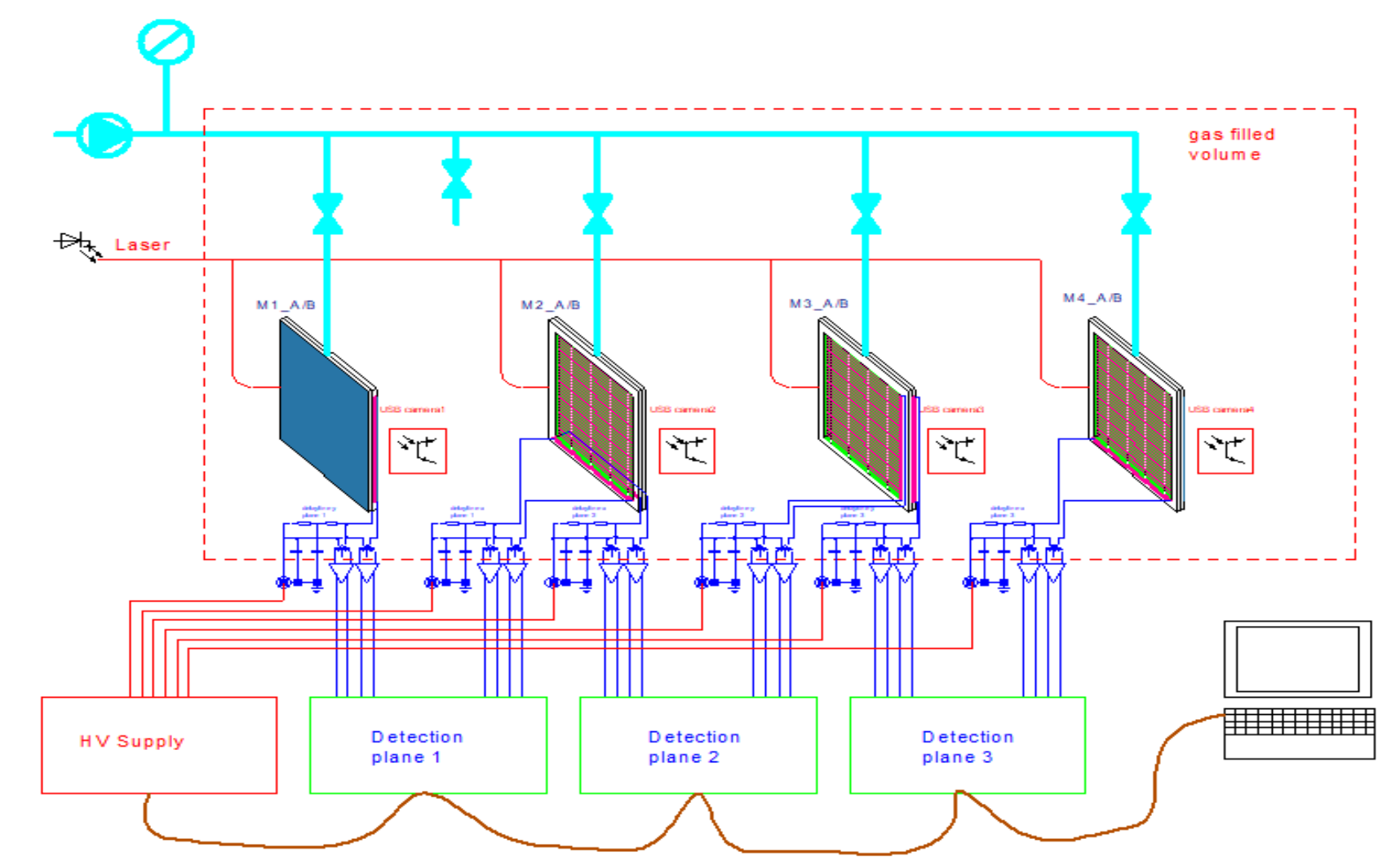


Anodenkennlinie

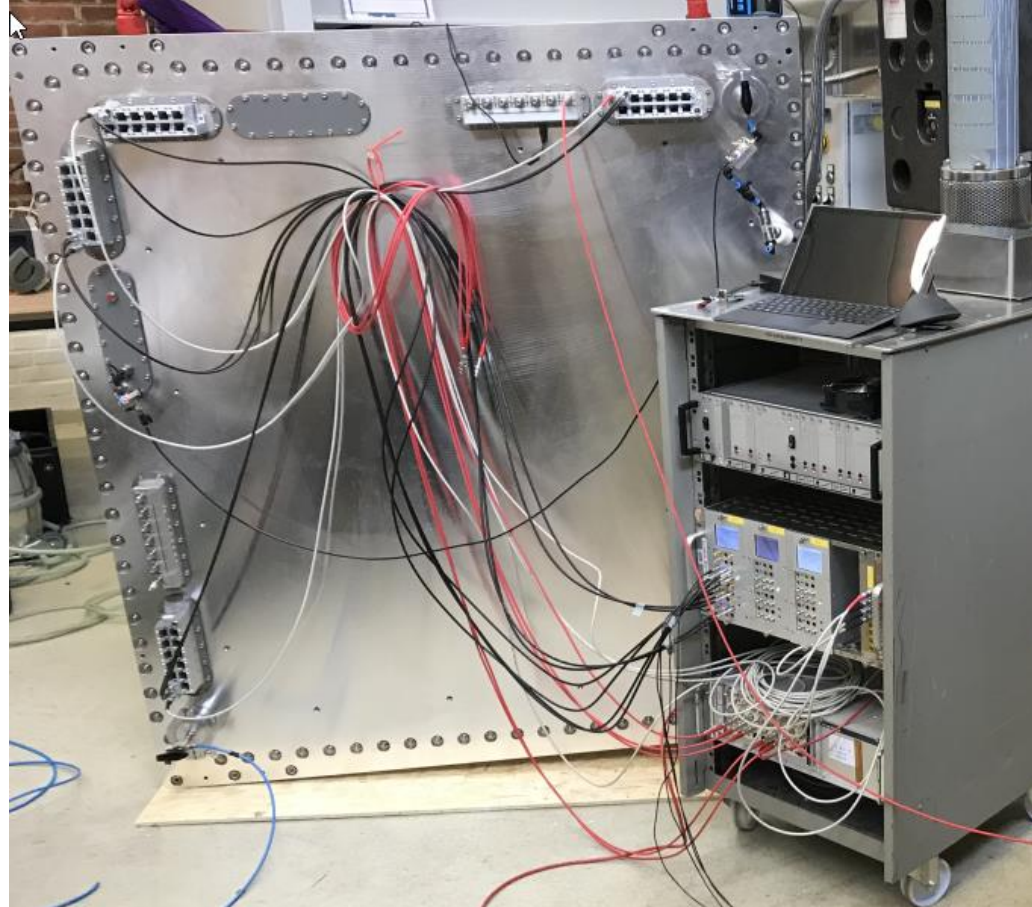


HiCoReLAN-Detektor (High Countrate Resolution Large Area Neutron)

Systemüberblick



HiCoReLAN-Detektor (High Countrate Resolution Large Area Neutron)



Vielen Dank.

www.hereon.de

