

ADAMAS17

Zagreb, 28.11.2017

Erich Griesmayer, CIVIDEC Instrumentation



Overview







- New developments
- R&D in 2017
 - Neutrons
 - X-rays
 - Anti-matter

New Products



excellence in radiation diagnostics

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 <p>BEAM INSTRUMENTATION</p>	 <p>NEUTRON DIAGNOSTICS</p>	 <p>X-RAY DIAGNOSTICS</p>
 <p>DETECTORS</p>	 <p>ELECTRONICS</p>	 <p>FOR STUDENTS</p>



turn-key solutions for beam diagnostics

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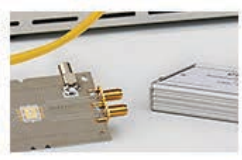
Products / Beam Instrumentation



A1

Diamond Beam Loss Monitor
 Machine Protection – Bunch-by-Bunch

1e5 Standard
 1e9 Hi-Rad
 1 ns, 5 ns
 AC / DC



A2

Diamond Beam Position Monitor
 Locating Charged Particle Beams

Hi-Rad
 1 um
 AC and DC



A5

Diamond Spectrometer
 The Heavy-Ion Spectroscope

Heavy Ions
 20 keV FWHM
 Rate: 1e6



A6







Diamond Phase Monitor
 Medical Machine Tuning

±20 ps
 1° at 100 MHz



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Products / Neutron Diagnostics



A3

Diamond Fast-Neutron Monitor
The Fast-Neutron Counter

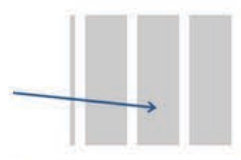
$n^+ > 6 \text{ MeV}$
1 MHz
Background rejection



A7

Diamond Thermal-Neutron Monitor
The Thermal-Neutron Counter

$n^- < 1 \text{ MeV}$
1 MHz
Gamma rejection



A8







Diamond Proton Recoil Telescope
Fast-Neutron Spectroscopy

Fast neutrons
3 - 22 MeV
1 MHz

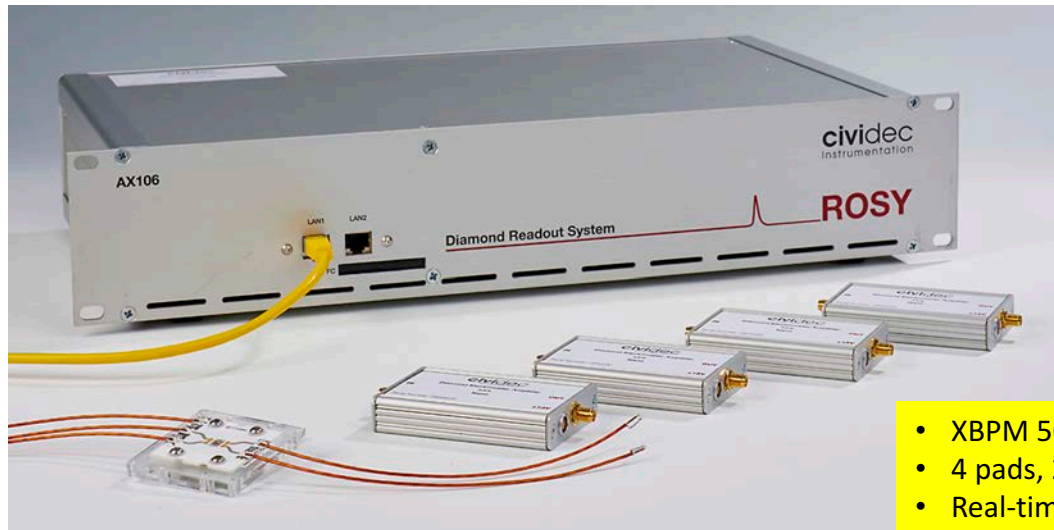


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XBPM System


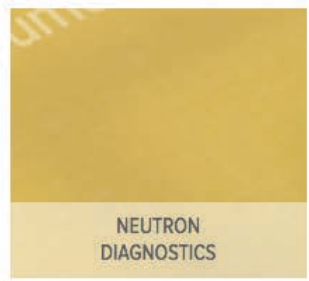

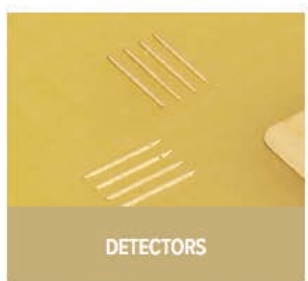




- XBPM 50 μm thick
- 4 pads, 2 μm separation
- Real-time readout 10 kHz
- Pico-Nano-Micro Amplifiers with low input impedance



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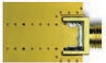





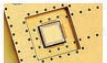



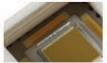


Detectors

cividec
Instrumentation

turn-key solutions for beam diagnostics

PRODUCTS CONTACT COMPANY PROFILE DOWNLOADS LOGIN SEARCH

Products / Detectors







 <p>sCVD Diamond Detector Universal Diamond Detector</p>	 <p>sCVD Diamond Beam Loss Detector Beam Losses at Electron Accelerators</p>	 <p>pCVD Diamond Detector Nanosized Tinting</p>	 <p>pCVD Diamond Beam Loss Detector Beam Losses at Proton Accelerators</p>
 <p>Spectroscopic Diamond Detector Robust & Fast Spectroscopy</p>	 <p>High-Radiation Diamond Detector Ultra-High Beam Losses</p>	 <p>Diamond Mosaic Detector Large Area sCVD Detector</p>	 <p>Thermal-Neutron Diamond Detector With ¹⁰B Converter, high Efficiency</p>
 <p>Compact Thermal-Neutron Diamond Detector Thermal-Neutron Probe</p>	 <p>High-Temperature Thermal-Neutron Diamond Detector Temperature resistant</p>	 <p>Fast-Neutron Diamond Detector Fusion Reactor Applications</p>	 <p>Compact Fast-Neutron Diamond Detector Fast-Neutron Probe</p>
 <p>High-Temperature Fast-Neutron Diamond Detector Temperature resistant</p>	 <p>Open-Design Diamond Detector Spectroscopy</p>	 <p>Diamond XRFM Detector Nanometer Precision for X-ray Beams</p>	 <p>Cryogenic Diamond Detector For coldest and emptiest Spaces</p>
 <p>Diamond Space Detector Robust in extreme Environments</p>	 <p>Diamondic Knife-Edge Detector The Minimalist Solution</p>	 <p>Slim-Design Diamond Detector The Probe</p>	 <p>Diamondic Telescope Detector Fast-Neutron Beam Monitoring</p>

- Standard
- High radiation
- Slim-design
- High-temperature
- UHV solutions
- Open design



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Electronics

The screenshot shows the Cividec Instrumentation website with the tagline "turn-key solutions for beam diagnostics". The navigation bar includes links for PRODUCTS, CONTACT, COMPANY PROFILE, DOWNLOADS, LOGIN, and SEARCH. The main content area displays a grid of product categories, each with a red arrow icon and a brief description:

- 2 GHz / 20 dB**: C1 Broadband Amplifier, 2 GHz, 20 dB. Radiation hard 20 dB Buffer Amplifier.
- 2 GHz / 20 dB**: C1-HV Broadband Amplifier, 2 GHz, 20 dB. General Purpose 20 dB Buffer Amplifier, integrated Bias-Tee.
- 2 GHz / 40 dB**: C2 Broadband Amplifier, 2 GHz, 40 dB. Radiation hard 40 dB Instrumentation Amplifier.
- 2 GHz / 40 dB**: C2-HV Broadband Amplifier, 2 GHz, 40 dB. General Purpose Current Amplifier, integrated Bias-Tee.
- TCT Amplifier**: C2-TCT TCT Amplifier, 10 kHz - 2 GHz, 40 dB. TCT Amplifier for Detector Physics, integrated Bias-Tee.
- C6**: Fast Charge Amplifier. The Fastest Charge Amplifier, integrated Bias-Tee.
- Cx**: Spectroscopic Shaping Amplifier. High-Precision Spectroscopy, integrated Bias-Tee.
- Cx-L**: Spectroscopic Amplifier. Spectroscopy with long Cables, integrated Bias-Tee.
- C8-Pico**: Electrometer Amplifier. pA Measurements.
- C8-Nano**: Electrometer Amplifier. nA Measurements.
- C8-Micro**: Electrometer Amplifier. μ A Measurements.
- Attenuator Set**: D4 Attenuator Set. With Frequency Compensation.
- AC-AC Splitter**: D3 AC-AC Splitter. Shaping the Signal.
- AC-DC Splitter**: D1 AC-DC Splitter. Measure AC and DC simultaneously.
- AC-AC-DC Splitter**: D6 AC-AC-DC Splitter. The LHC Solution for Expanded Dynamic Range.
- ROSY®**: E2 ROSY® A2016. Real-Time Data Acquisition and Processing System.

- Broadband amplifiers:
 - 20 dB/ 40 dB / 2 GHz
 - Hi radiation
 - TCT
 - Timing
- Spectroscopy amplifiers.
 - Low noise
 - High gain
 - Gaussian shaping
 - 10 ns, 180 ns, 1.2 us
 - High temperature (175°C)
- Electrometer amplifiers:
 - Pico
 - Nano
 - Micro
- Passive components
- **ROSY®** readout system

Amplifiers

- Broadband Amplifier
 - Beam Loss (1 MGy)
 - TCT (3 kHz)
 - Timing (ps time resolution)
- Spectroscopic Amplifier
 - 10 ns / 30 pF
 - 180 ns / 200 pF
 - High-temperature (175°C)
- Electrometer Amplifier
 - Low noise
 - Low impedance

new 2017







new 2017





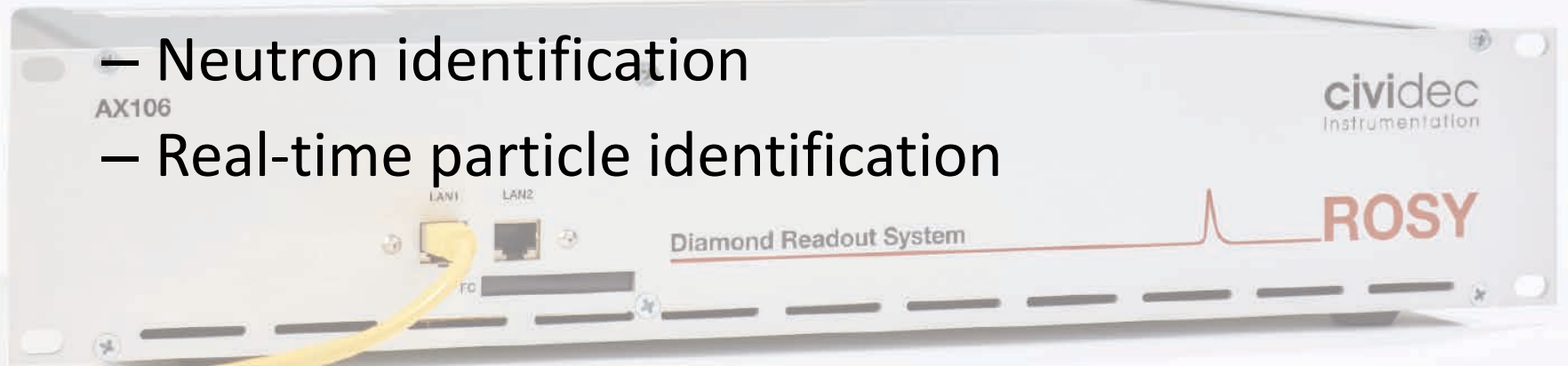
excellence in radiation diagnostics

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Data Readout

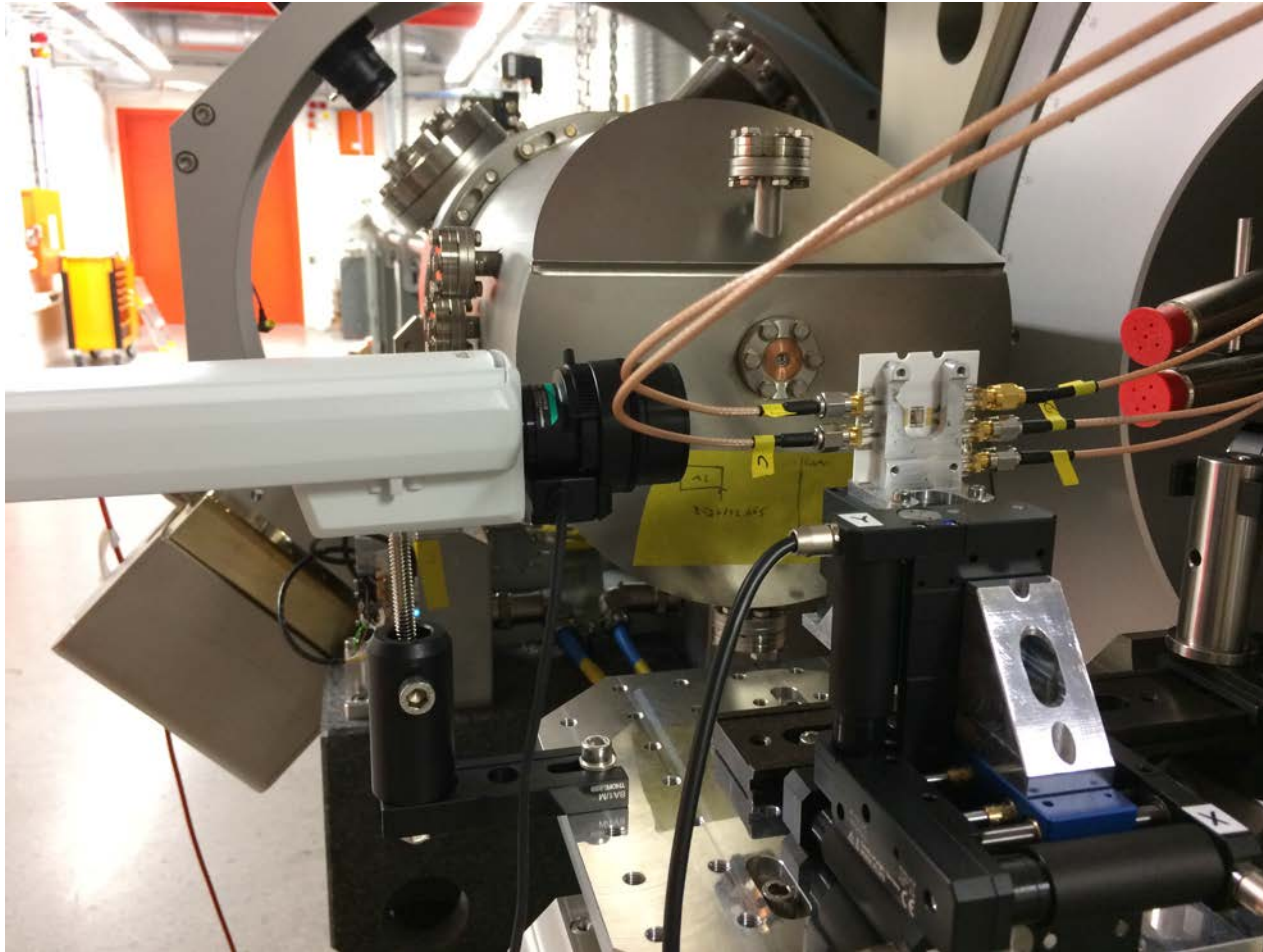
- **ROSY[®]**:
 - Beam loss measurements
 - Timing measurements
 - Heavy-Ion spectroscopy
 - Neutron identification
 - Real-time particle identification



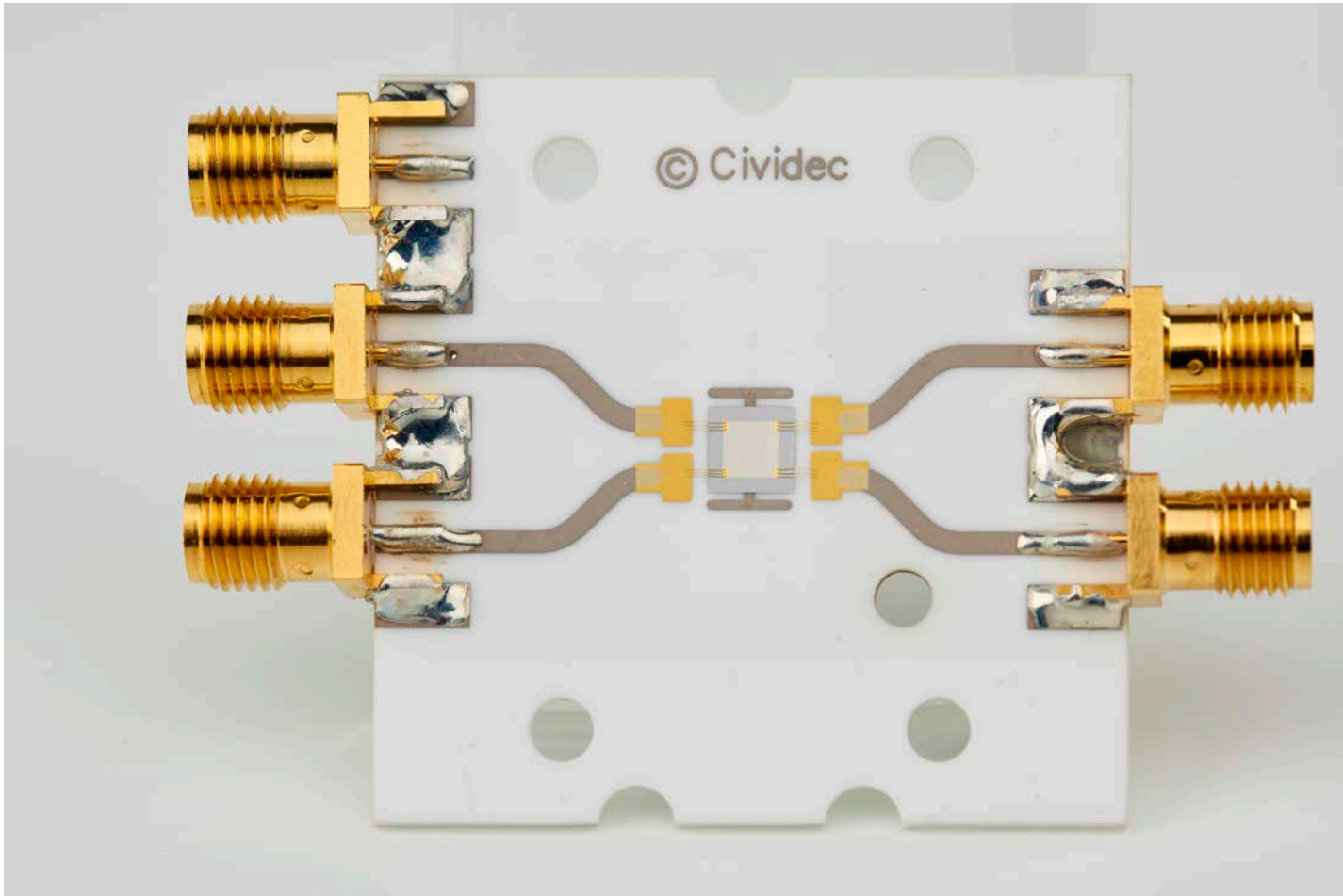
R&D in 2017

X-Rays

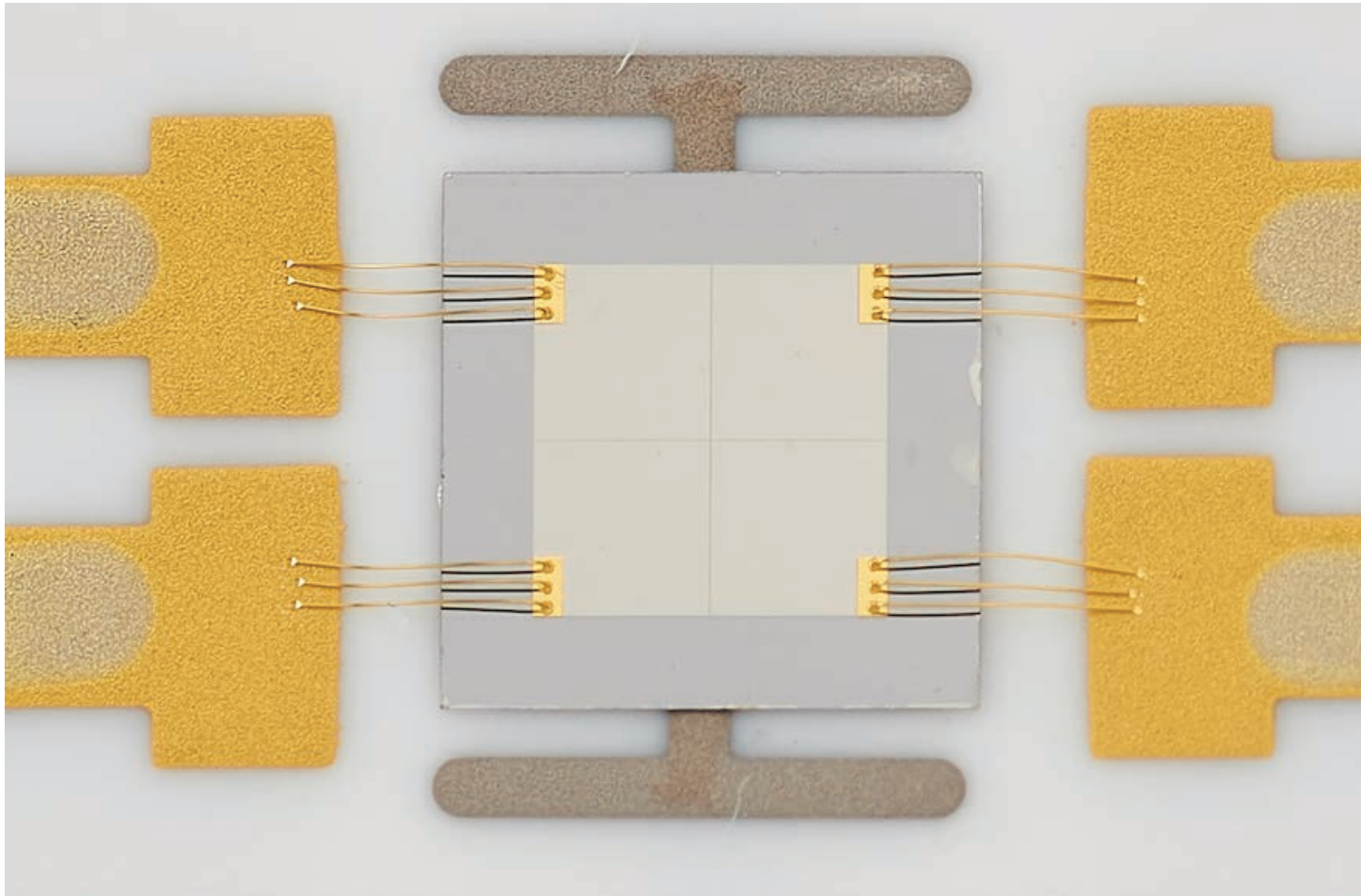
Max IV -- Nano Beamline



XBPM

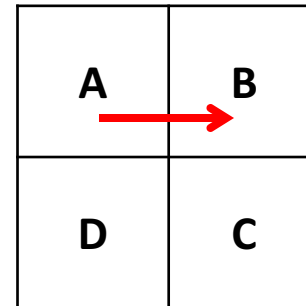


XBPM -- 2u gap

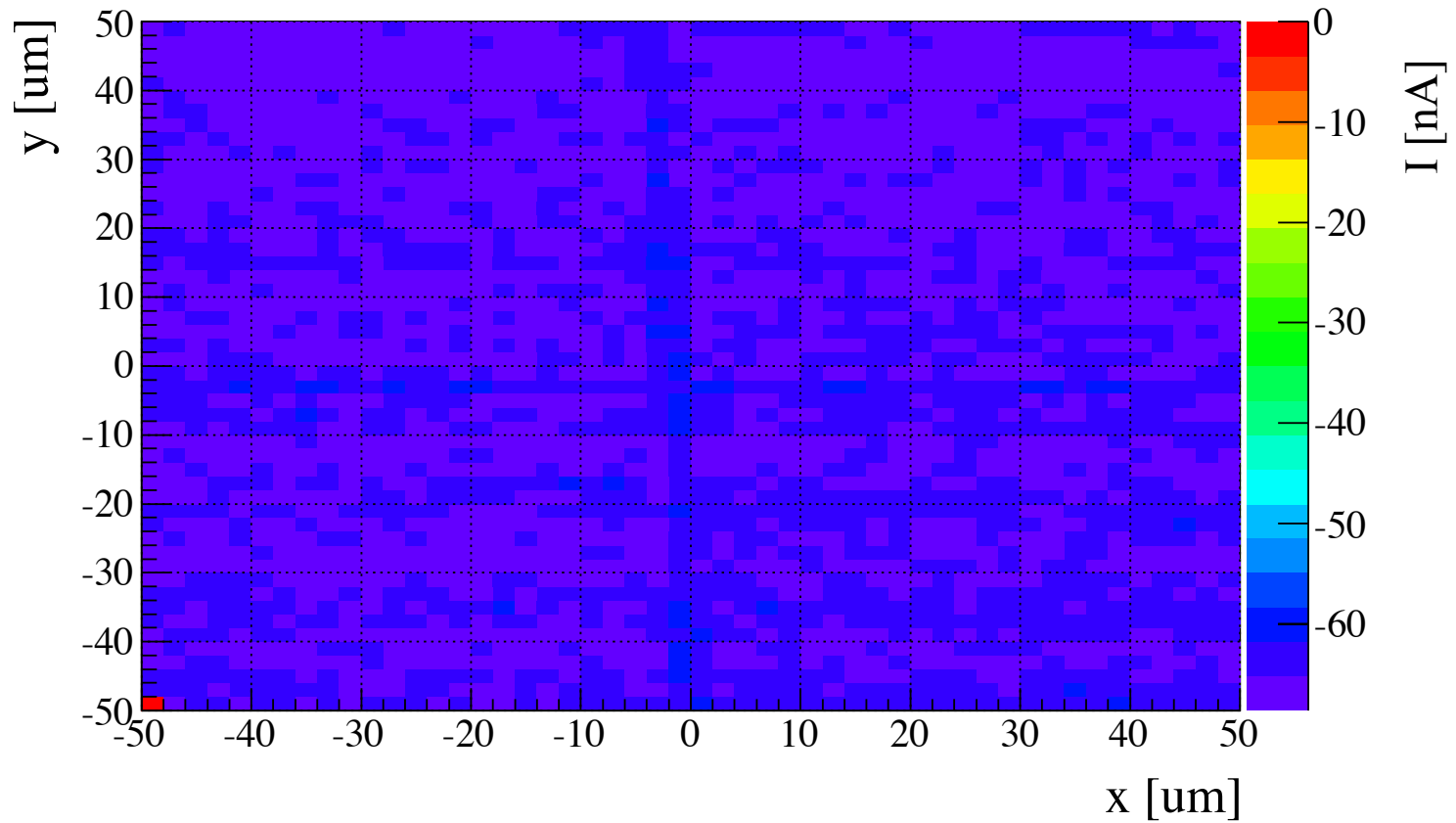


Test at Max IV - Lund

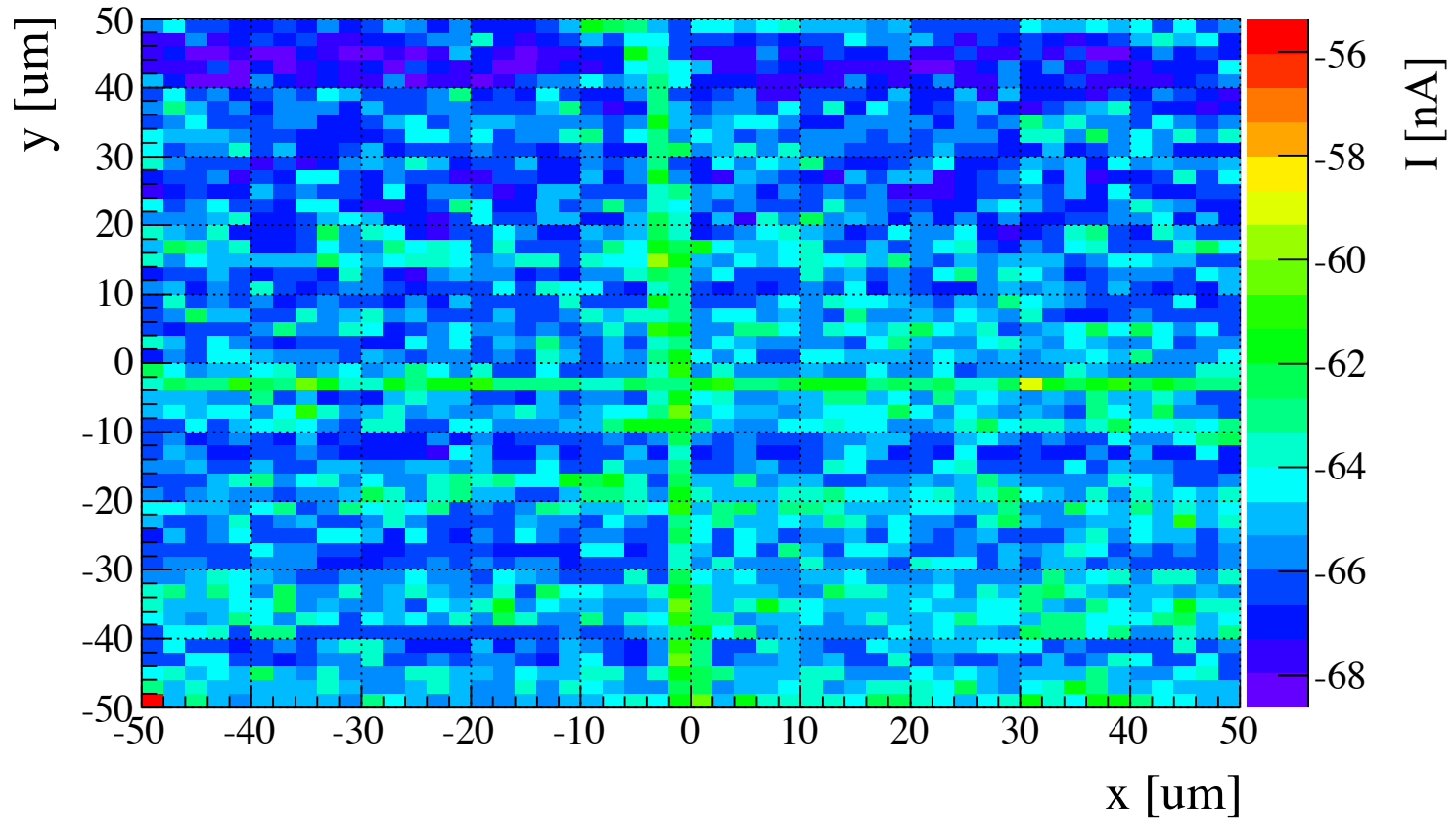
- 13 keV photons
- 100 nm beam
- Horizontal 1D-scan
- 25 nm step size

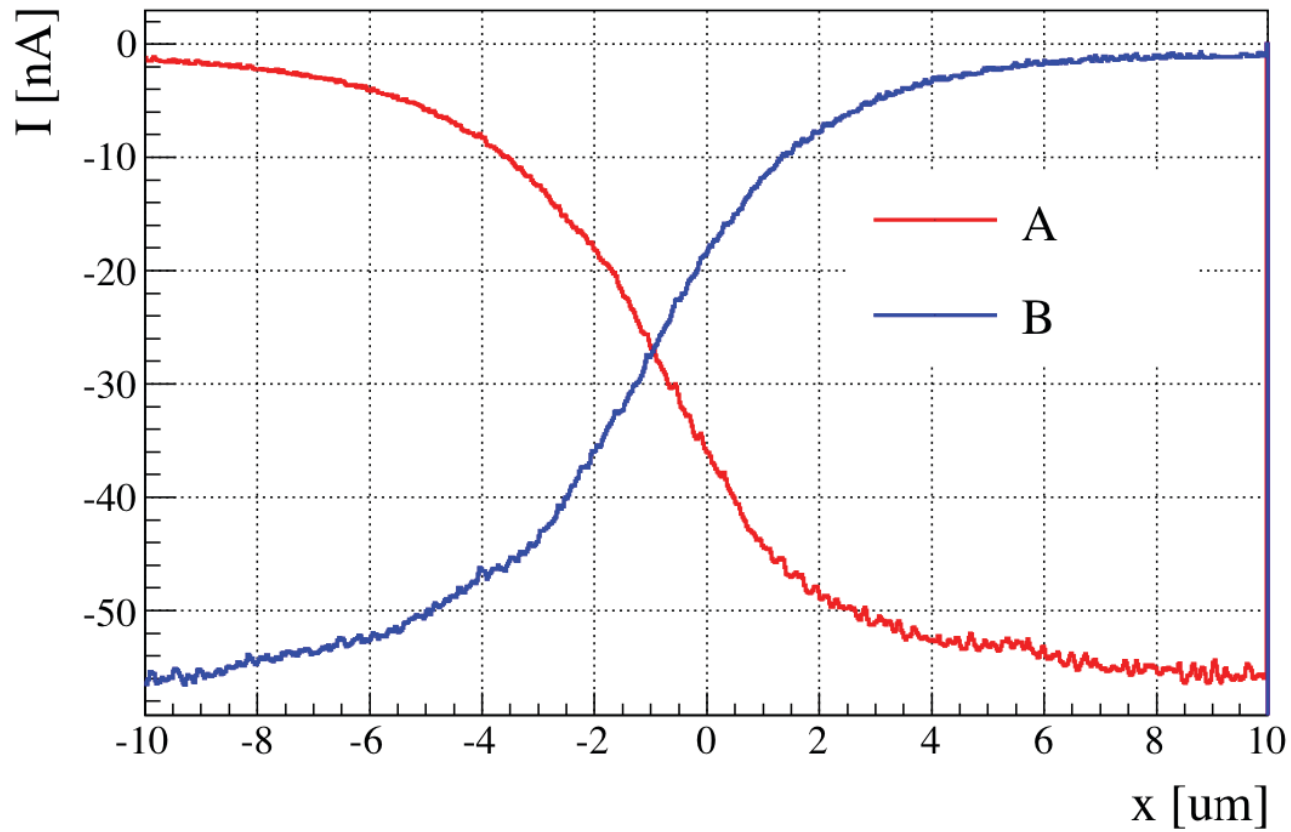


Intensity

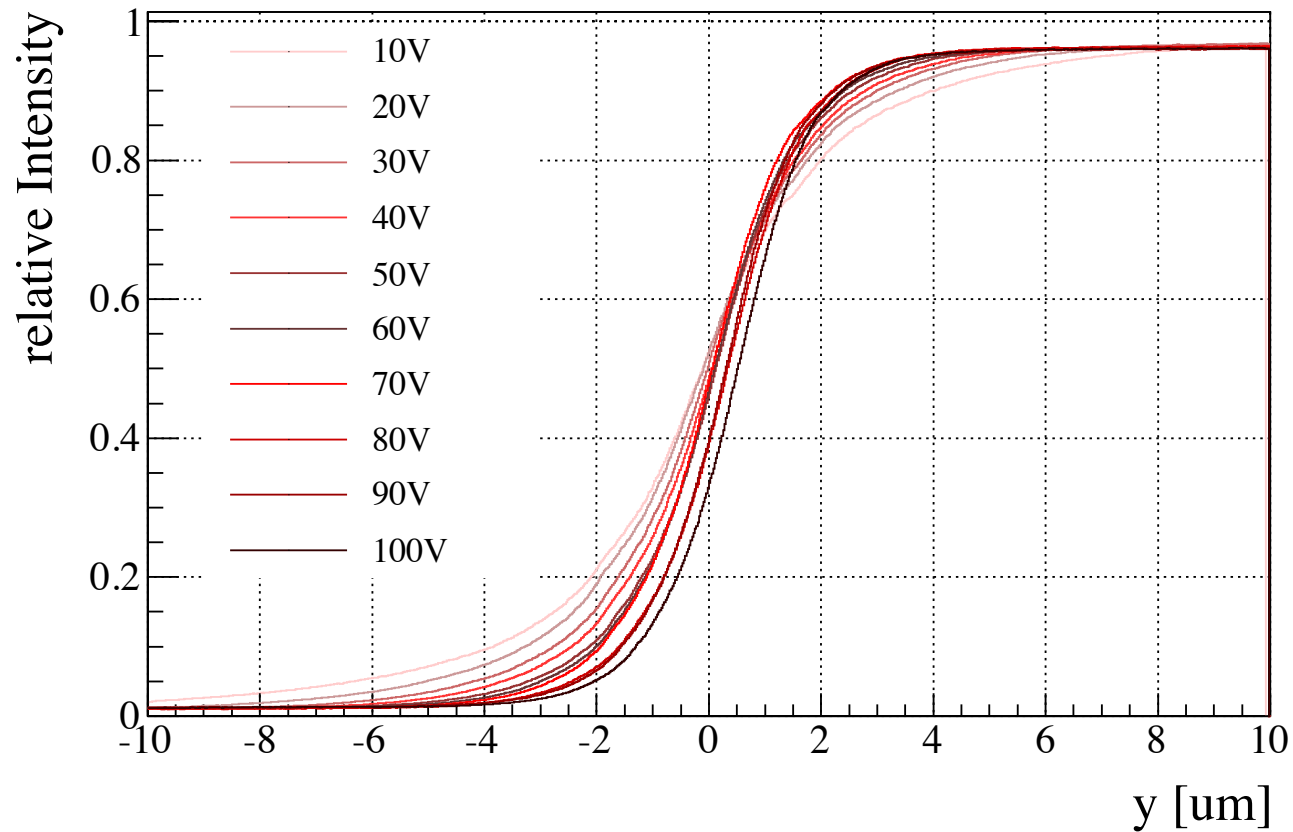


Intensity Zoom

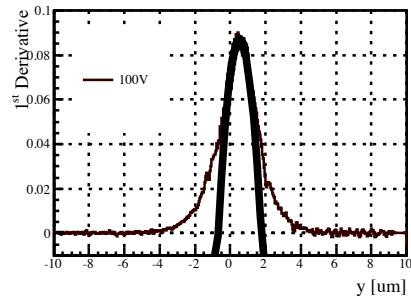
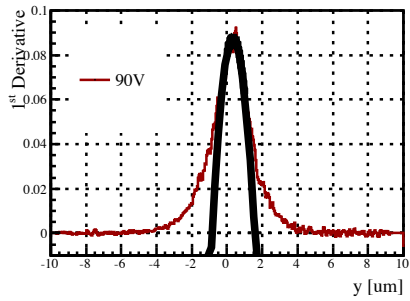
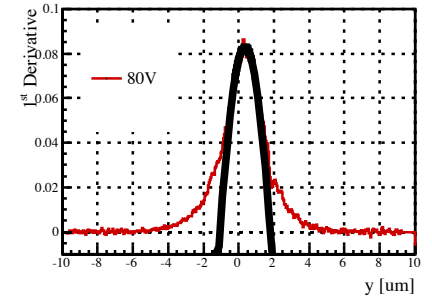
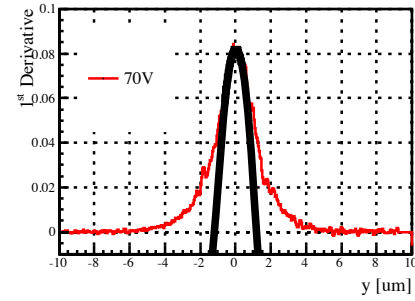
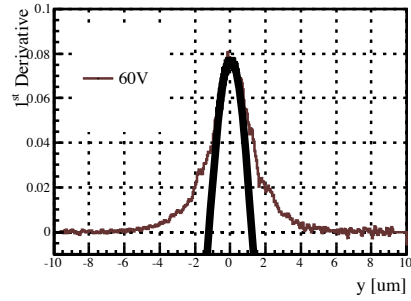
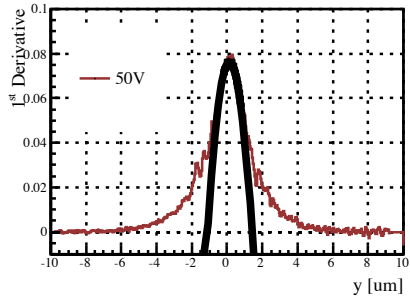
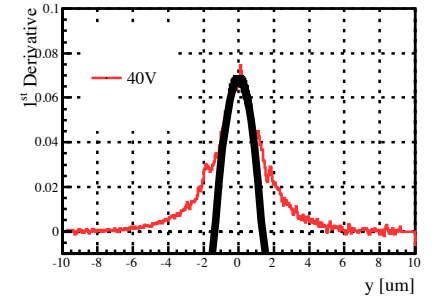
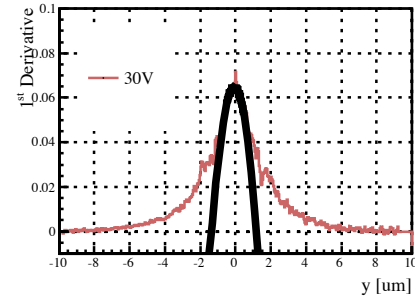
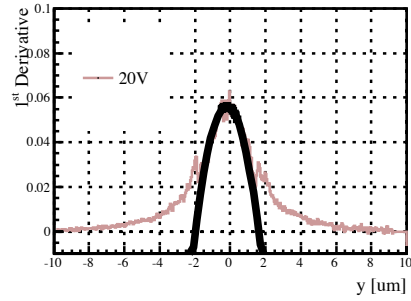
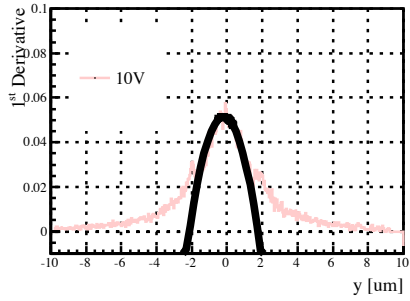




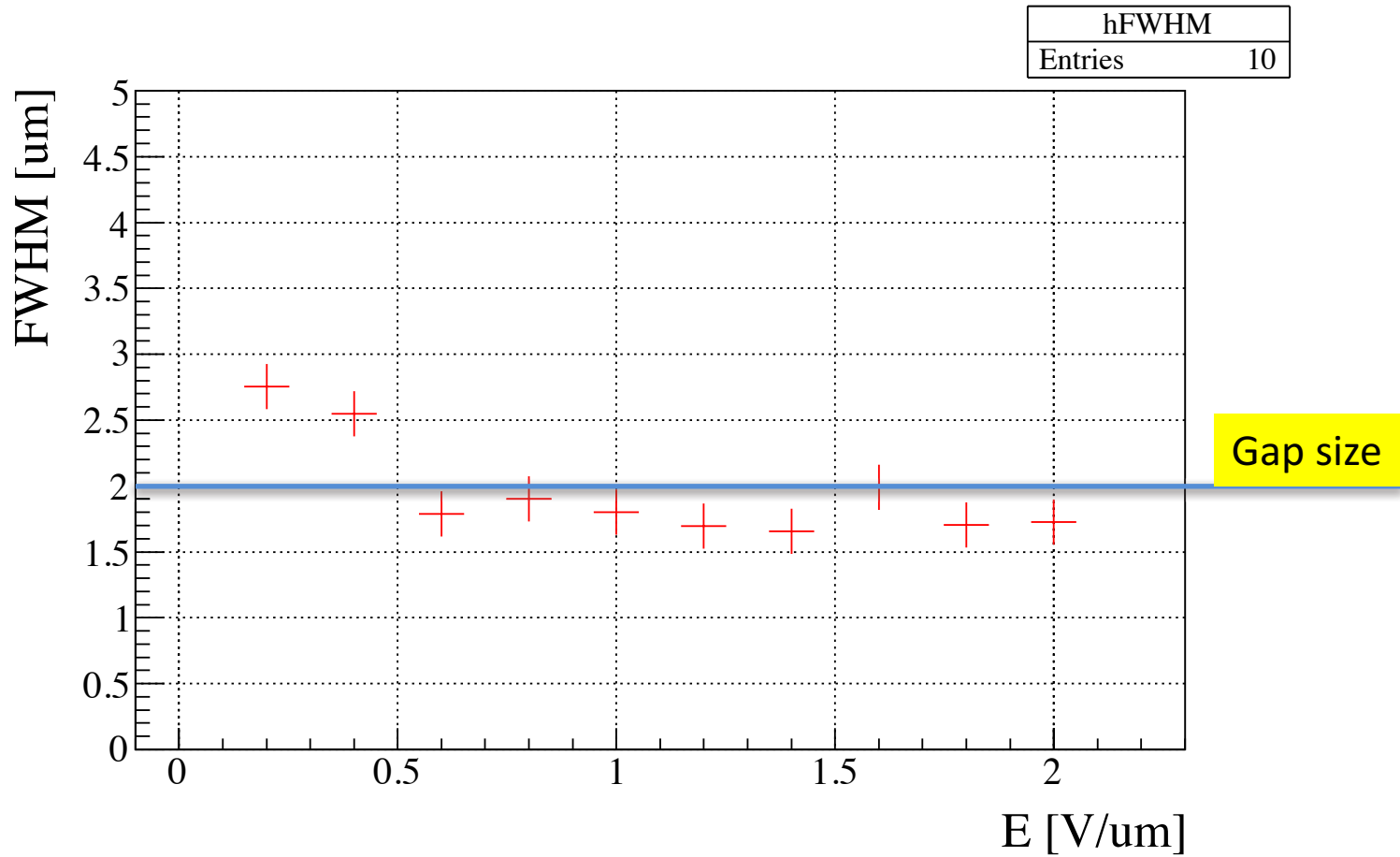
Voltage Scan



Parabolic Fit

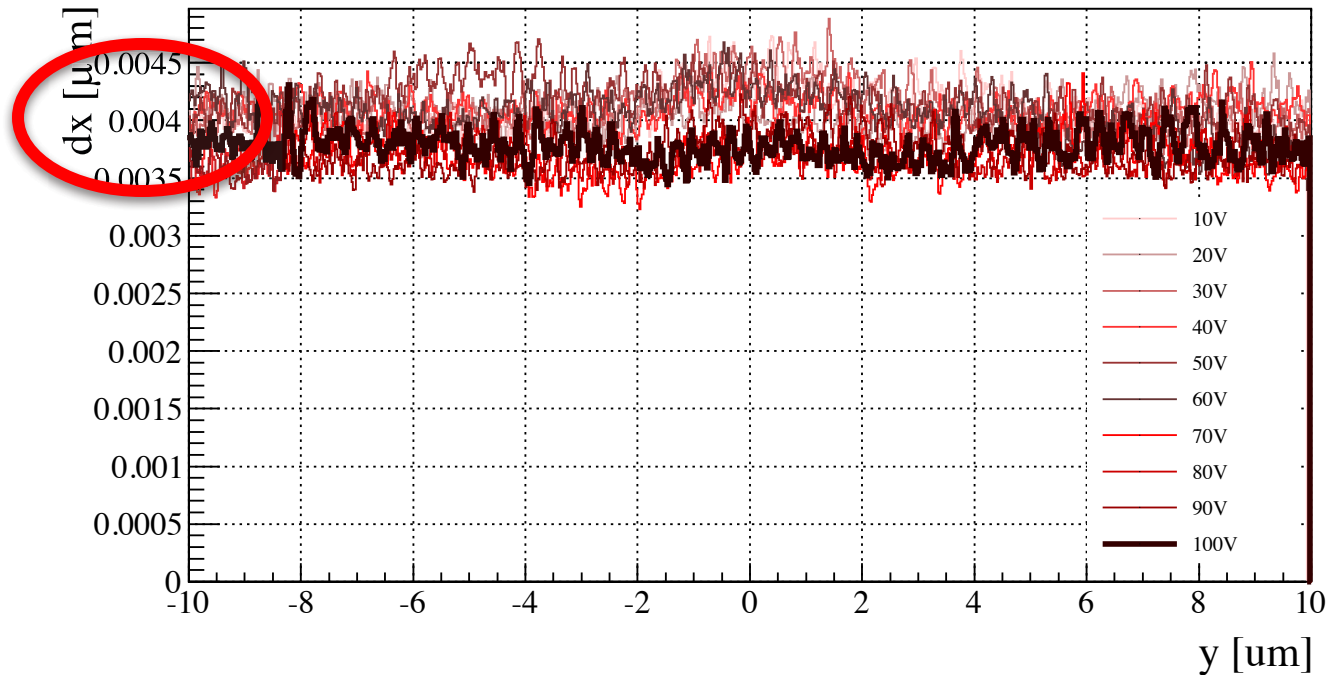


FWHM



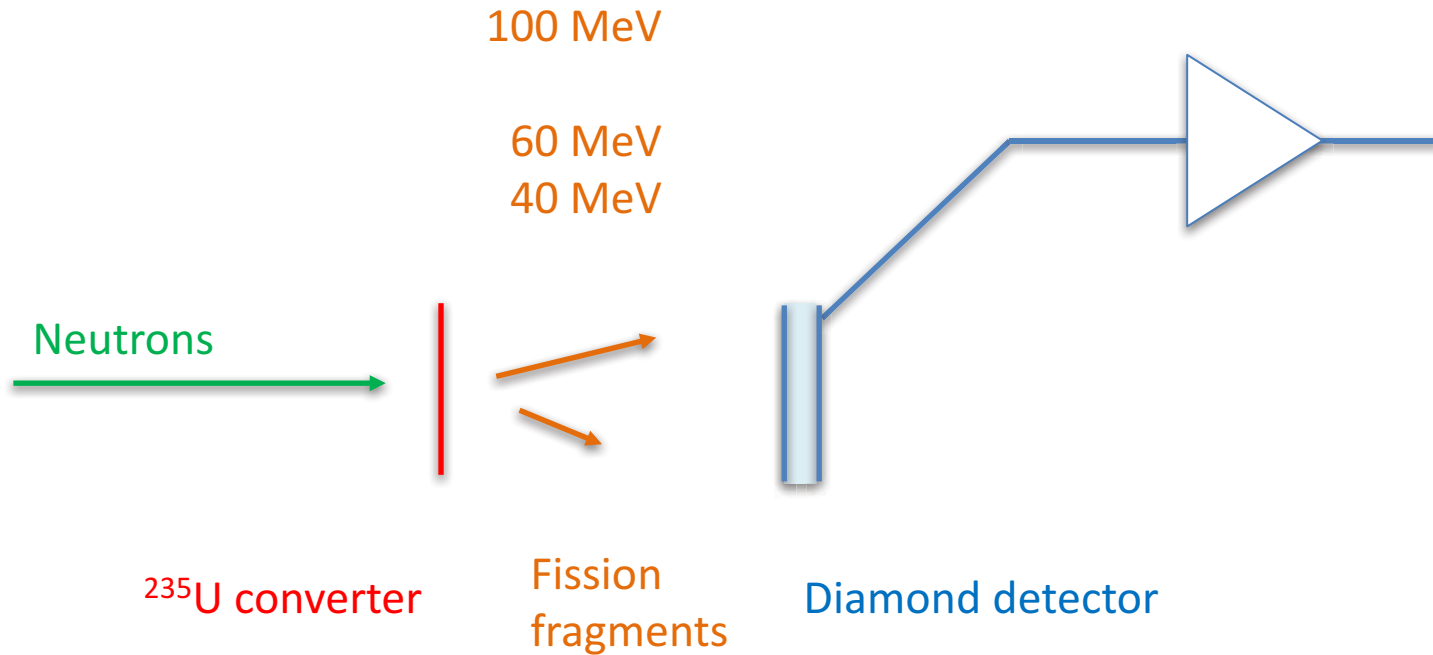
Position Uncertainty

±4 nm

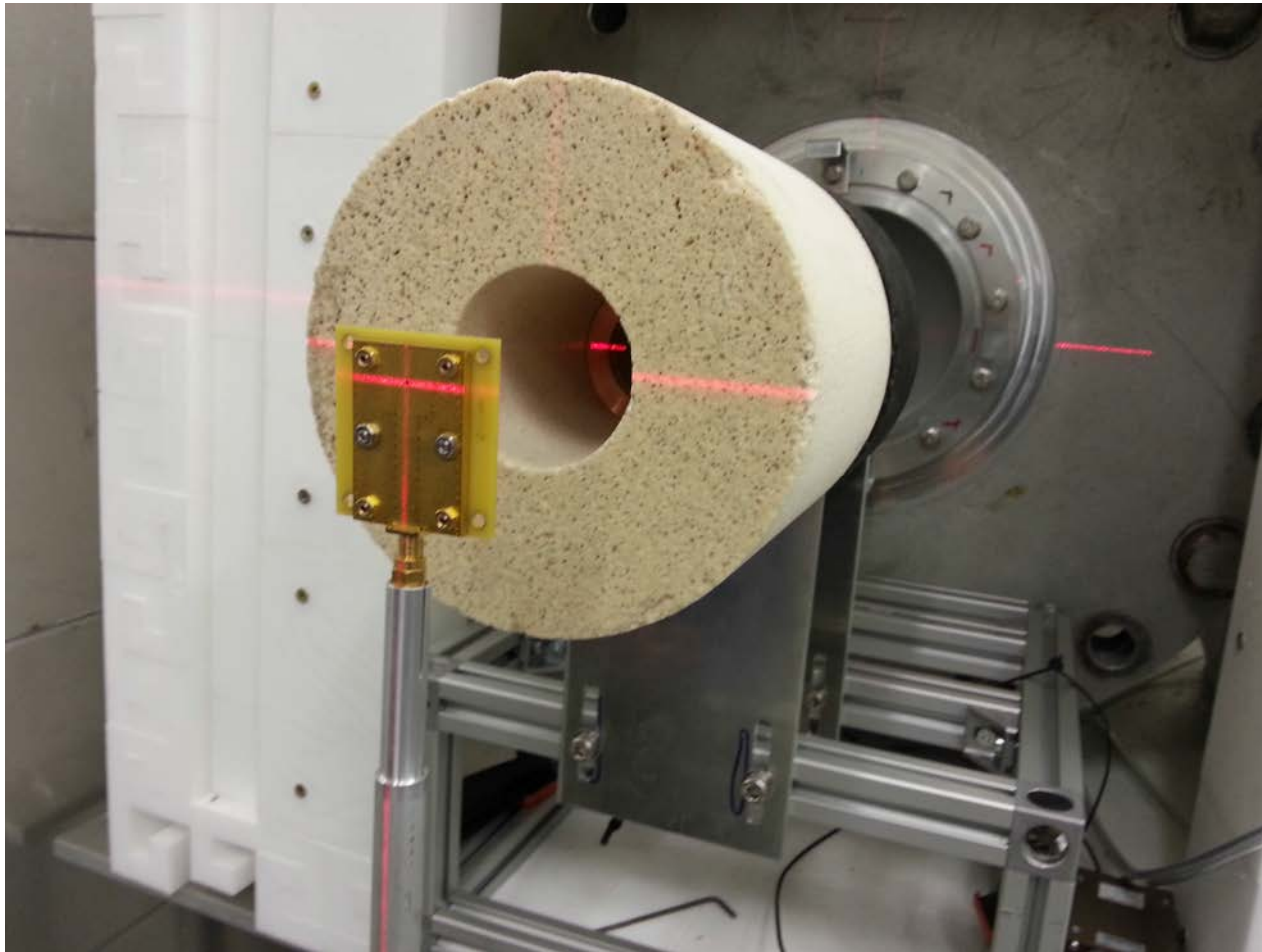


Nuclear Fission

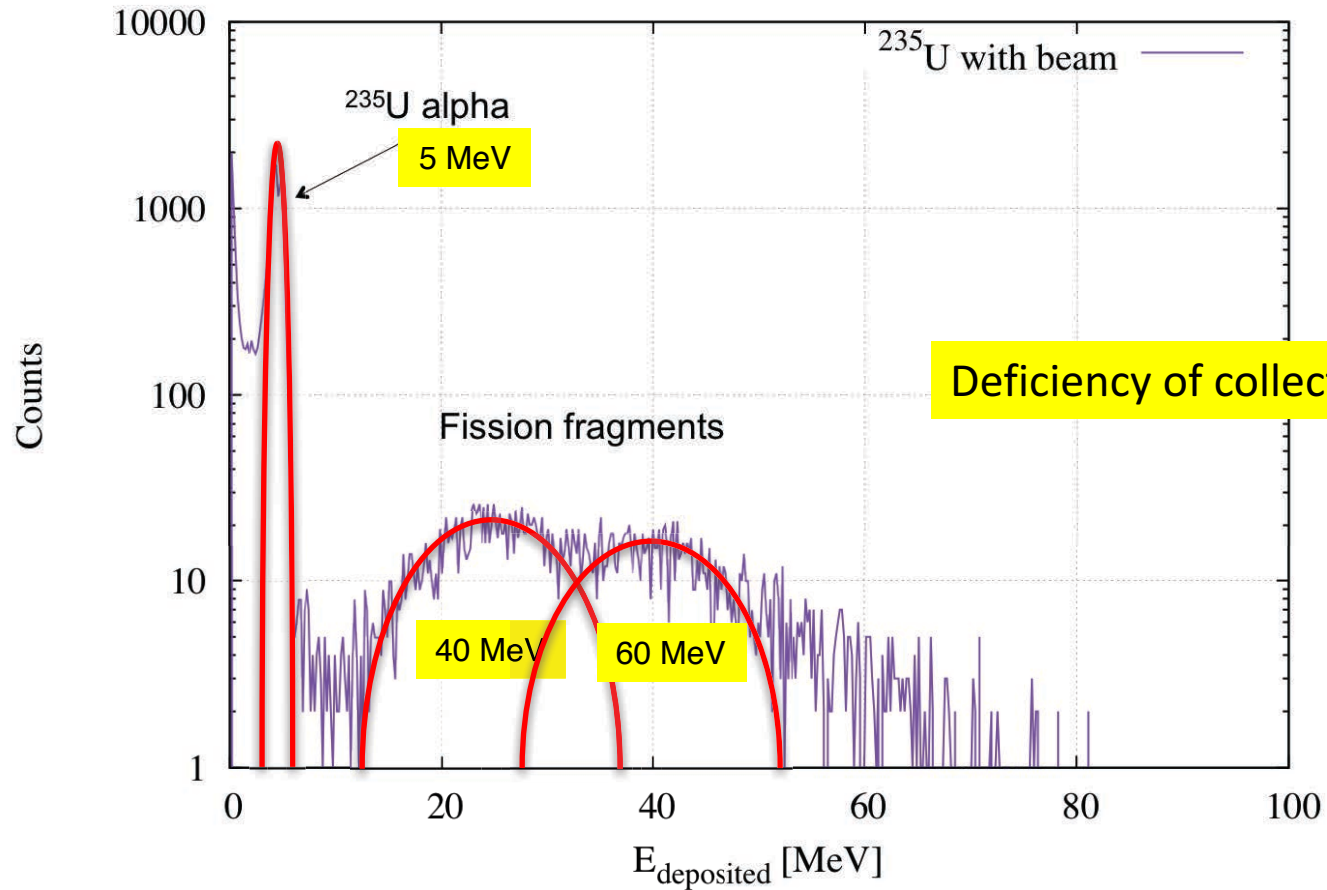
Spent Fuel Detector



EC-JRC Neutron Beam Line

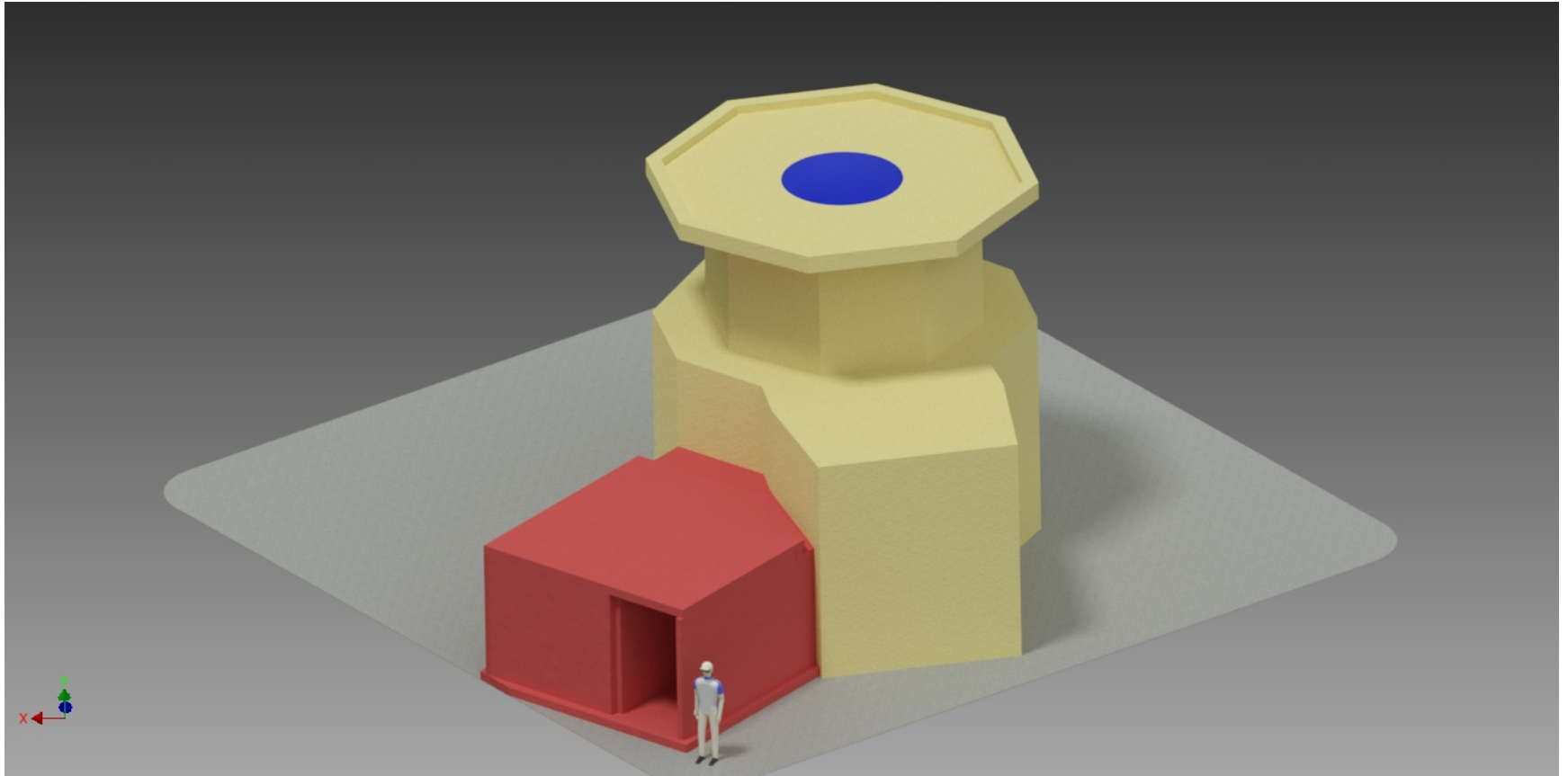


Measured Spectrum



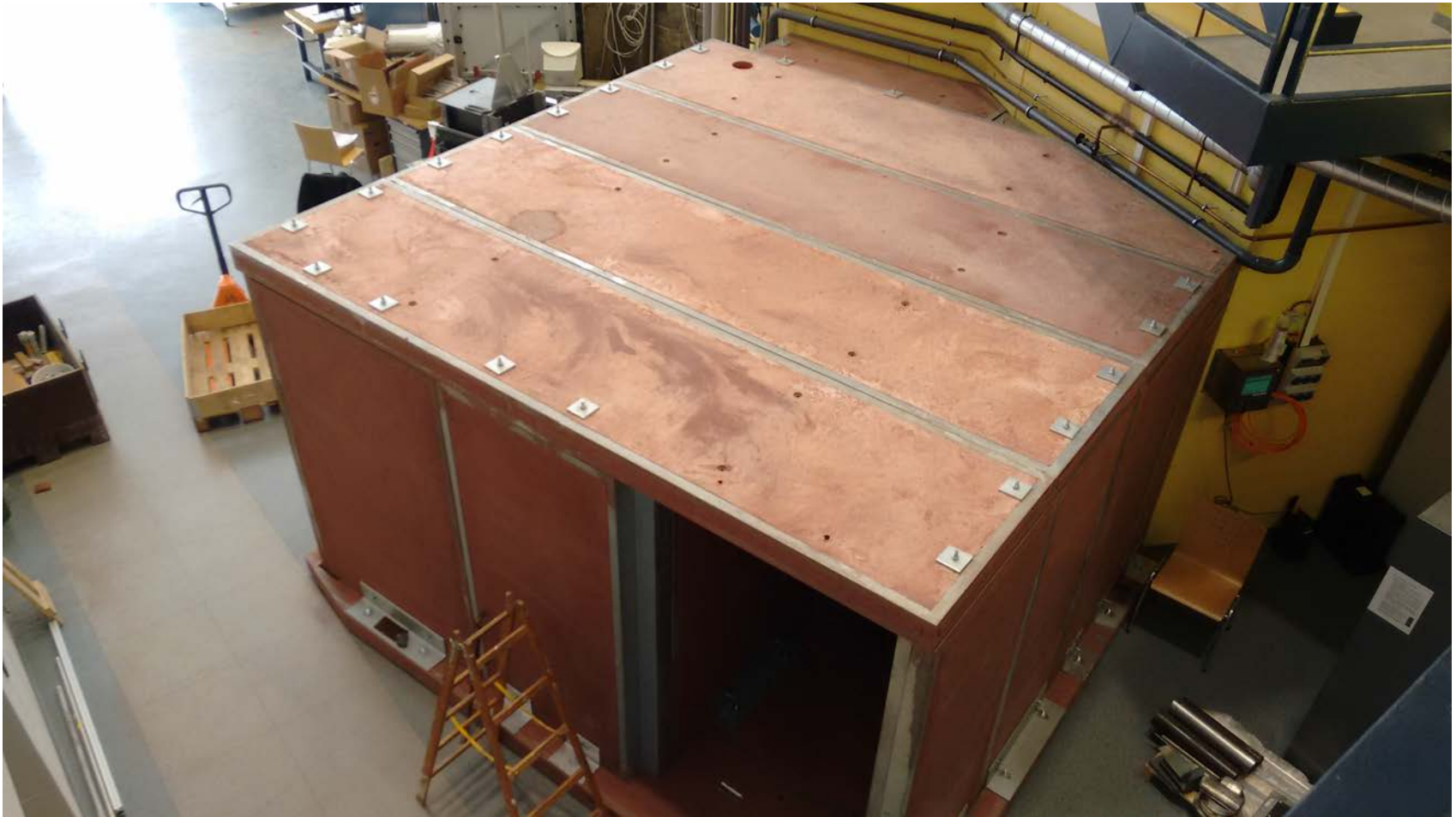
Nuclear Reactor

TRIGA Reactor in Vienna



New White Beam Line

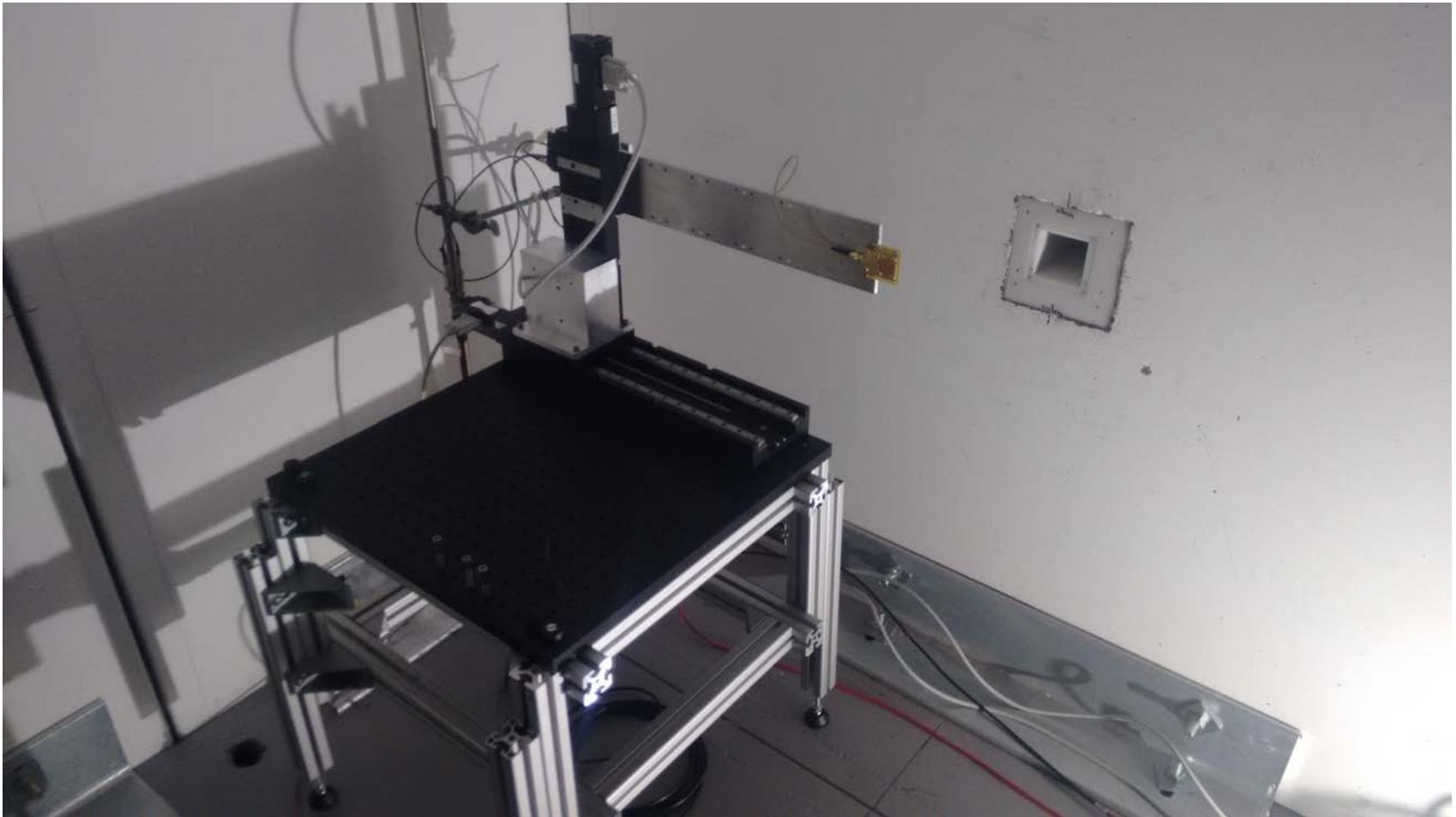
cividec
Instrumentation



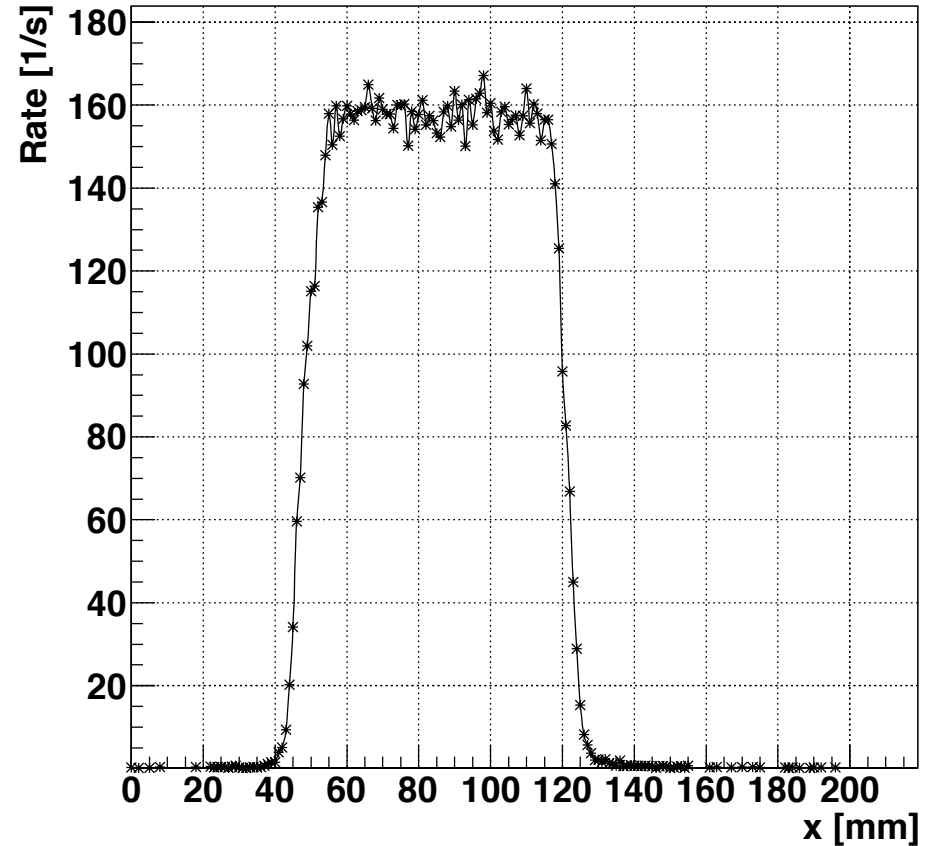
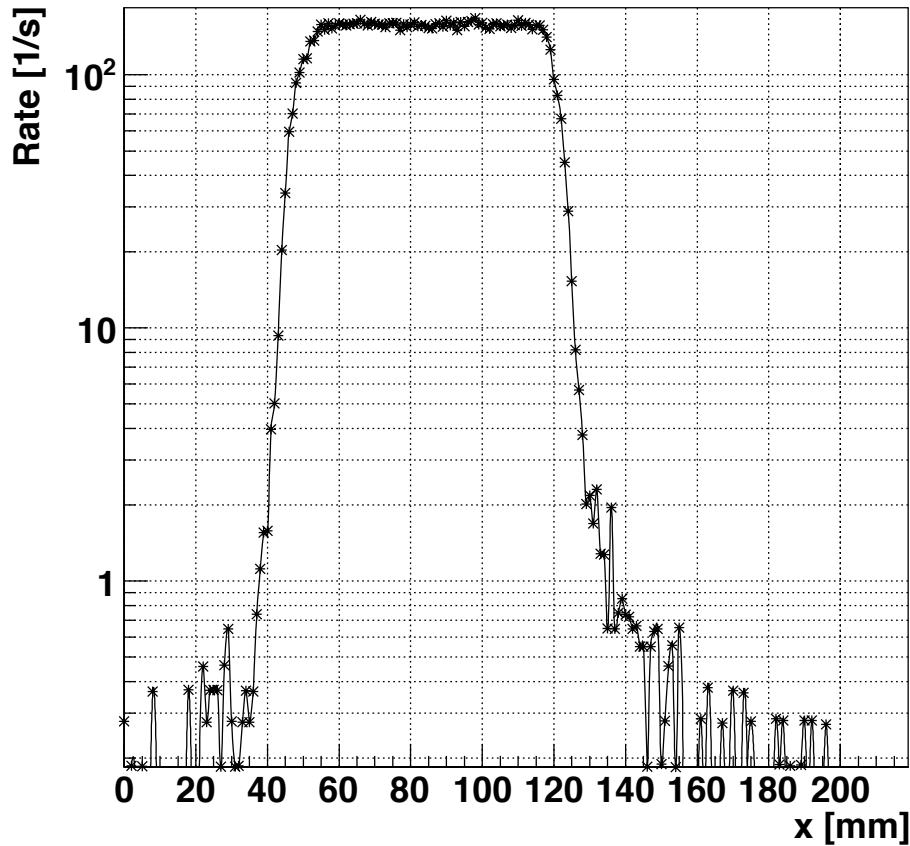
Measurement Setup



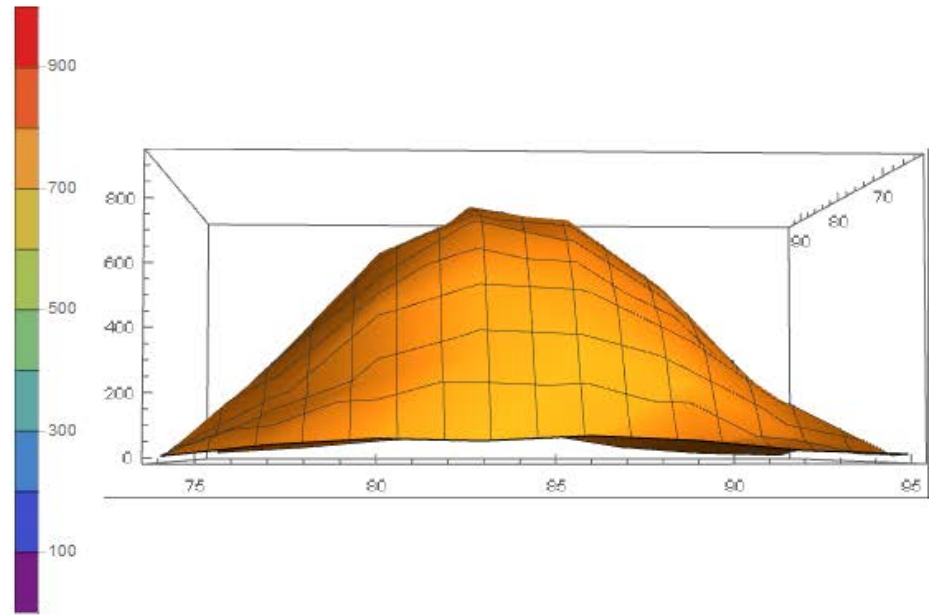
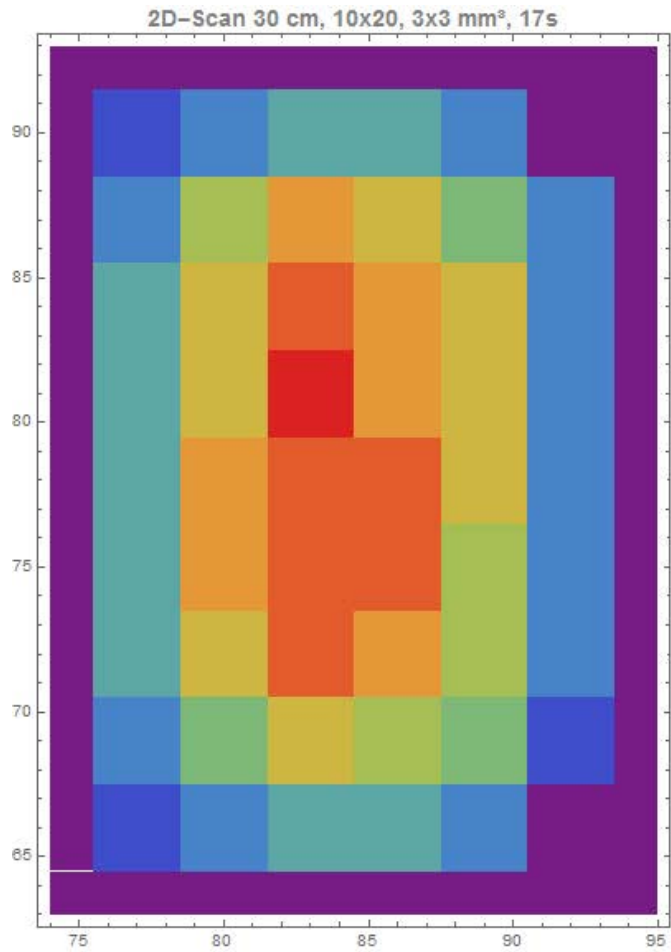
X-Y Table



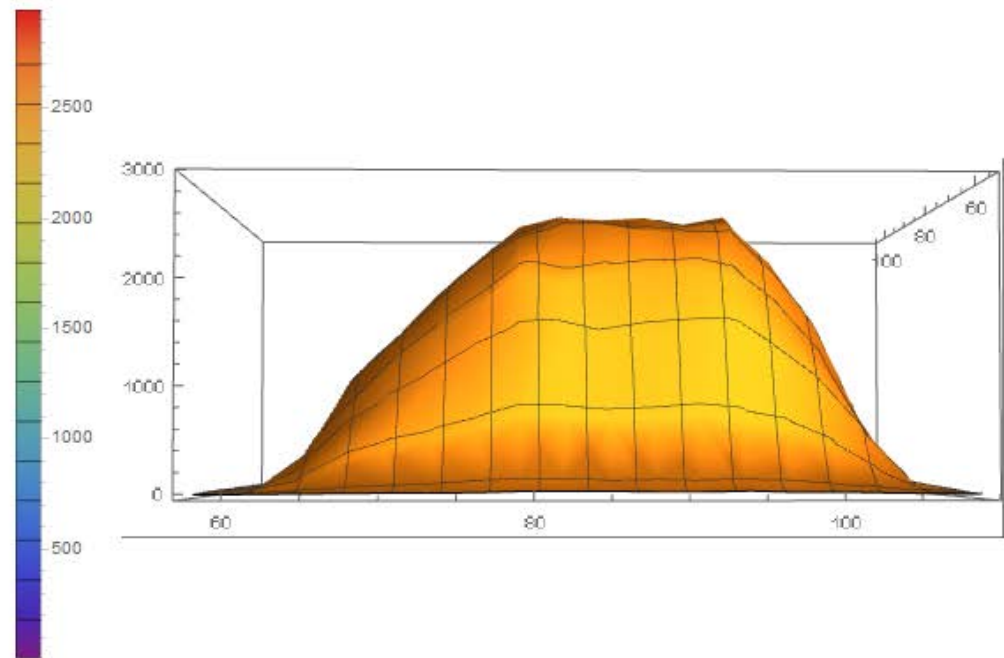
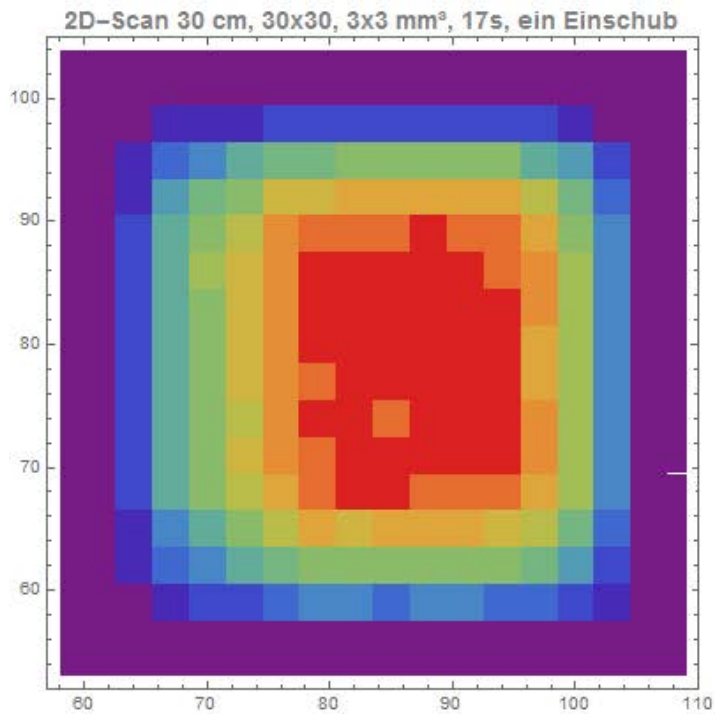
Beam Profile



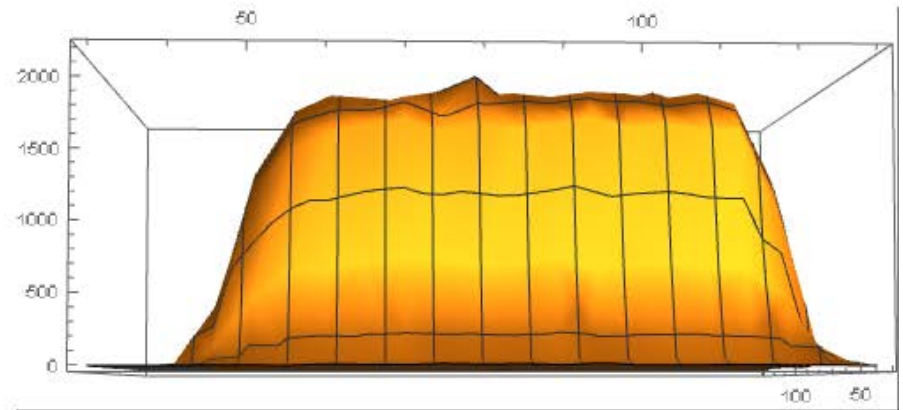
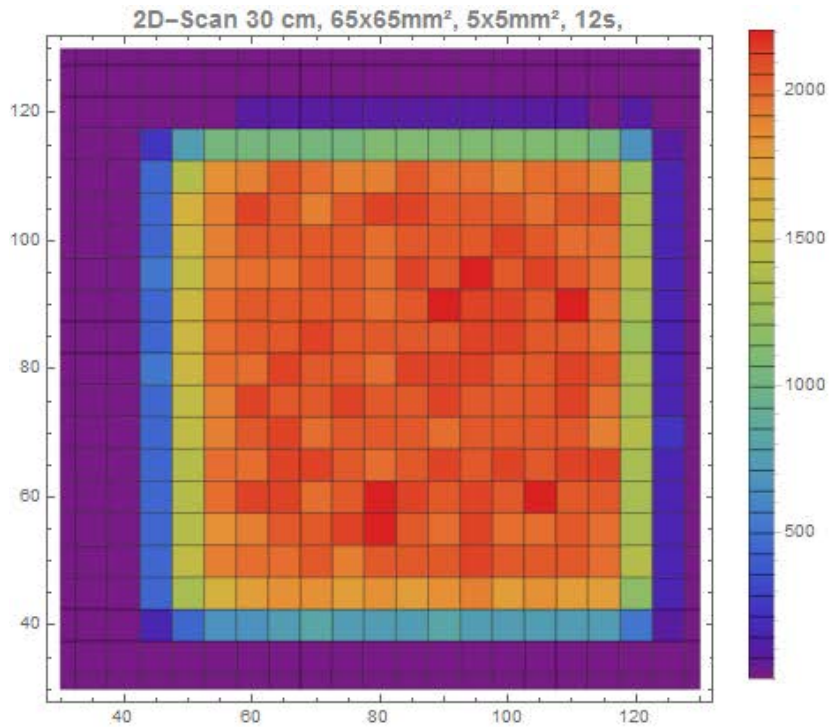
2D Beam Profile



2D Beam Profile



2D Beam Profile



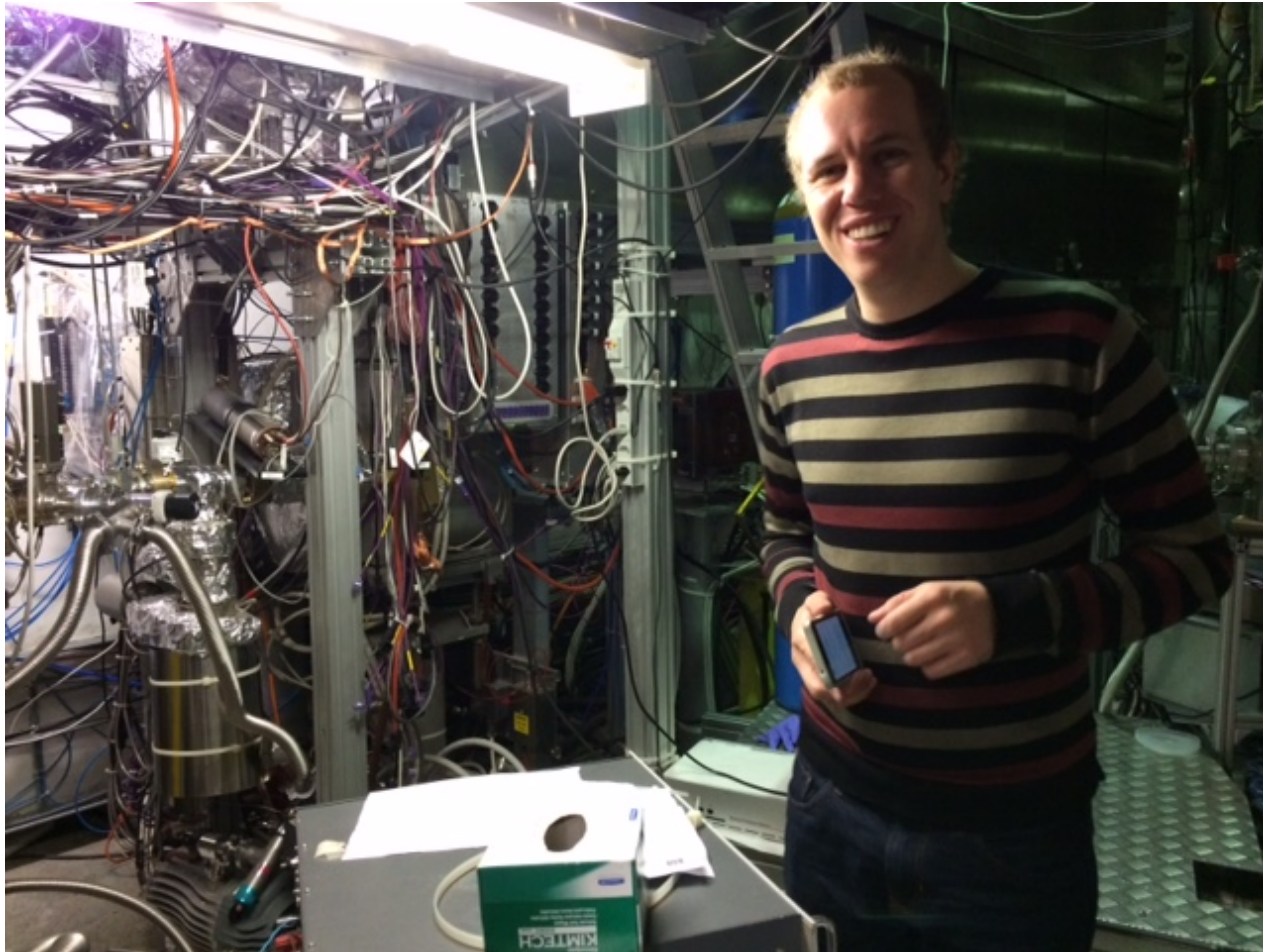
Anti-Protons

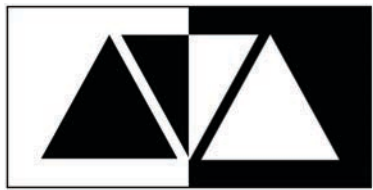
Measured at the Antiproton Decelerator Facility at CERN

AD Hall



Miha Cerv at AEGIS at CERN



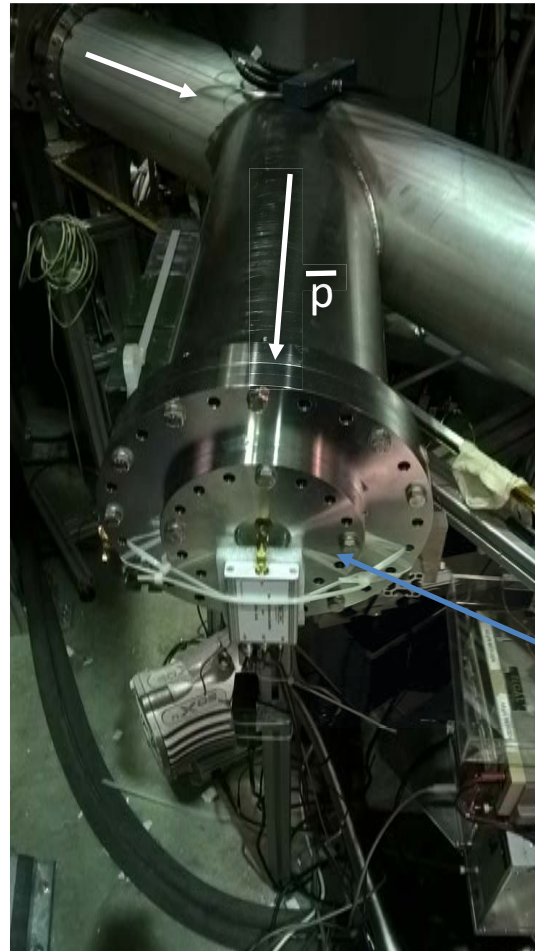


AVA Project

This work is carried out in the frame of the EC funded Marie Skłodowska-Curie Innovative Training Network:

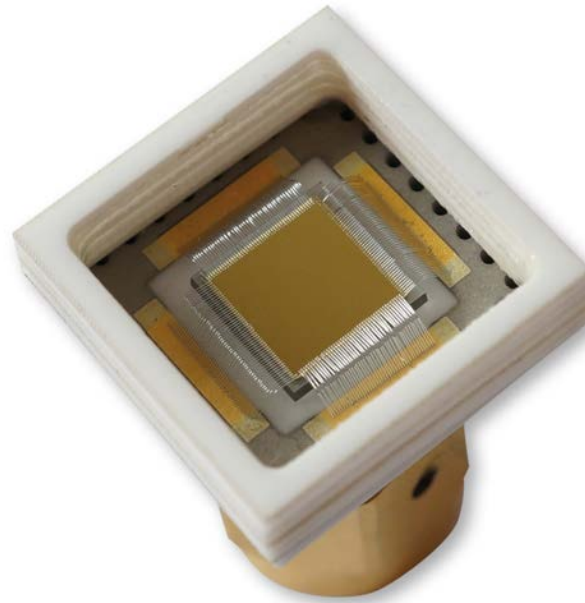
- AVA - Accelerator Validating Antimatter Physics
- Grant Agreement 721559 AVA
- Our PhD fellow: Miha Červ (Slovenia)
- Funded for three years, 1.4.2017 – 30.3.2020
- TU Wien, Faculty of Electrical Engineering

Antiprotons



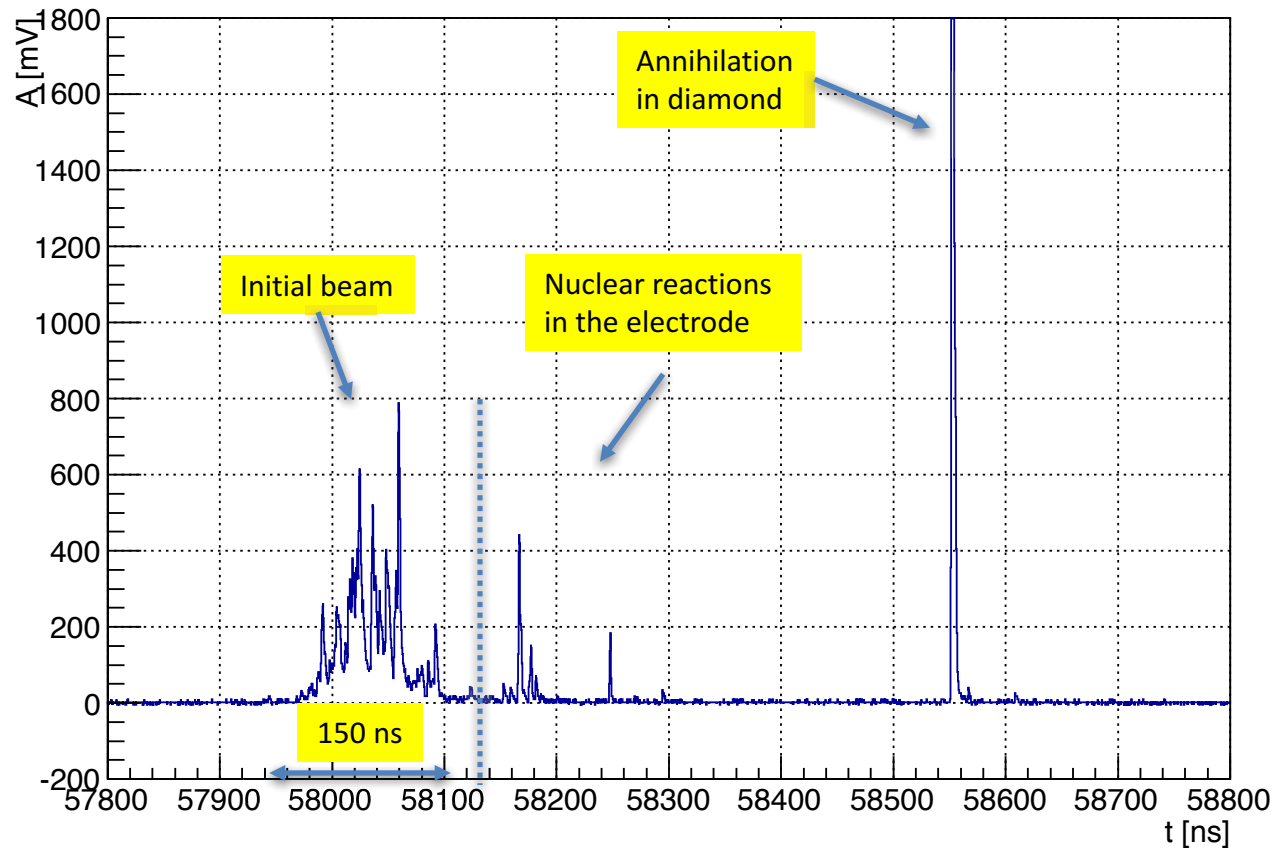
Detector in vacuum
Amplifier outside
ROSY readout

Knopf Detector



sCVD diamond (E6)
500 um thick
4 mm x 4 mm electrodes,
250 nm thick (Ti-Pt-Au)

Detector Response



Courtesy Angela Gligorova Stefan Meier Institut, Wien,
Michael Doser, CERN

Data taking and analysis ongoing → ADAMAS 2018.

www.cividec.at

