Overview

• New developments
• R&D in 2017
  – Neutrons
  – X-rays
  – Anti-matter
New Products
CIVIDECK Instrumentation - turn-key solutions for beam diagnostics

PRODUCTS
- A3: Diamond Fast-Neutron Monitor
  - The Fast-Neutron Counter

- A7: Diamond Thermal-Neutron Monitor
  - The Thermal-Neutron Counter

- A8: Diamond Proton Recoil Telescope
  - Fast-Neutron Spectroscopy

Specifications:
- n+ > 6 MeV
- 1 MHz
- Background rejection

- n- < 1 MeV
- 1 MHz
- Gamma rejection

- Fast neutrons
- 3 - 22 MeV
- 1 MHz

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XBPM System

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

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

- 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
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
Test at Max IV - Lund

- 13 keV photons
- 100 nm beam
- Horizontal 1D-scan
- 25 nm step size
Intensity Zoom
Voltage Scan

![Voltage Scan Graph](image.png)
Parabolic Fit
Position Uncertainty

±4 nm

dx [μm]

y [μm]
Nuclear Fission
Spent Fuel Detector

Neutrons → 235U converter → Fission fragments → Diamond detector

- 100 MeV
- 60 MeV
- 40 MeV
EC-JRC Neutron Beam Line
Measured Spectrum

Counts vs. $E_{\text{deposited}}$ [MeV]

- $^{235}\text{U}$ alpha
  - 5 MeV

- Fission fragments
  - 40 MeV
  - 60 MeV

- $^{235}\text{U}$ with beam

Deficiency of collected charge!
Nuclear Reactor
TRIGA Reactor in Vienna
New White Beam Line
Measurement Setup
X-Y Table
Beam Profile
2D Beam Profile

2D-Scan 30 cm, 10x20, 3x3 mm², 17s
2D Beam Profile
2D Beam Profile

2D-Scan 30 cm, 65x65mm², 5x5mm², 12s,
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 Sklodowska-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

![Graph showing detector response with annotations: Initial beam, Annihilation in diamond, Nuclear reactions in the electrode, 150 ns delay.]

Data taking and analysis ongoing → ADAMAS 2018.

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