ADAMAS 2019

Erich Griesmayer
CIVIDEK Instrumentation
Beam Instrumentation
Anniversary

10 YEARS
Portfolio

- Charged particles
- Neutrons
- Photons
Portfolio

- Charged particles
- Neutrons
- Photons
Portfolio

• Charged particles
  – Beam loss
  – Spectroscopy
  – High-radiation
Portfolio

• Charged particles
  – Beam loss
  – Spectroscopy
  – High-radiation
Bethe-Bloch

Stopping power [eV/μm]

Proton
Electron

2.8 fC = 1 μA

MIP, MED, SPS, LEP, SLC, SP8, TVT, LHC

Energy [eV]
Portfolio

• Charged particles
  – Beam loss
  – Spectroscopy
  – High-radiation
α - Spectrum

Counts

Counts

Deposited energy [keV]

80 keV

70%

30%

20 keV FWHM

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Portfolio

• Charged particles
  – Beam loss
  – Spectroscopy
  – High-radiation
High-radiation

Beam intensity [MIP/pulse]

Equivalent charge yield [C]

1 MIP

1 uA

1 kA

1e9 MIP
Portfolio

• Charged particles
• Neutrons
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Portfolio

• Neutrons
  – DD-process, 2.45 MeV
  – DT-process, 14.3 MeV
  – Thermal neutrons
Portfolio

• Neutrons
  – DD-process, 2.45 MeV
  – DT-process, 14.3 MeV
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2.45 MeV neutrons

Counts

 Deposited energy [MeV]
Portfolio

• Neutrons
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14.3 MeV neutrons
Portfolio

• Neutrons
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Thermal neutrons

Counts vs. Energy [MeV]

- γ-background
- α
- t

Measurement vs. Simulation

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Portfolio

• Charged particles
• Neutrons
• Photons
Portfolio

• Photons
  – X-ray
  – Gamma ray
Portfolio

• Photons
  – X-ray
    – Gamma ray
X-ray interaction

Compton scattering

Photoelectric absorption

Deposited energy [keV]
Charge yield

![Graph showing charge yield vs X-ray energy in keV]
Detector signal

The graph shows the relationship between intensity [photons/s] and current for different energy levels (5 keV, 10 keV, 15 keV, 20 keV, 25 keV) on a 50 μm diamond detector. The graph plots current on the y-axis in pA, nA, µA, mA, and mA, and intensity on the x-axis in photons/s ranging from $10^4$ to $10^{16}$. The lines indicate how the current increases with increasing intensity for each energy level.
Portfolio

• Photons
  – X-ray
  – γ-ray
Interaction mechanism

- Compton scattering
- Pair production

Deposited energy [MeV]

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Charge yield

![Graph showing charge yield versus gamma energy](Image)
Customers

34 nations
In 10 years ...

• 200 customers
• 34 nations
• 30 students
• 74 CVD related publications
• 600 projects
2020

• New laboratory
  – Clean room
  – Cross polarizer
  – IV station
  – Landau station
  – Spectroscopy station

• In cooperation
  – Radioactive sources: Atominstitut
  – Neutron sources: Sevilla, Frascati, Athens, Geel
  – Research reactor: Atominstitut
  – High energetic protons: CERN, MedAustron
Centre of Vienna
Open position

• Marie Curie Fellowship
• Starting mid 2020
• Possibility for permanent position
Anniversary