

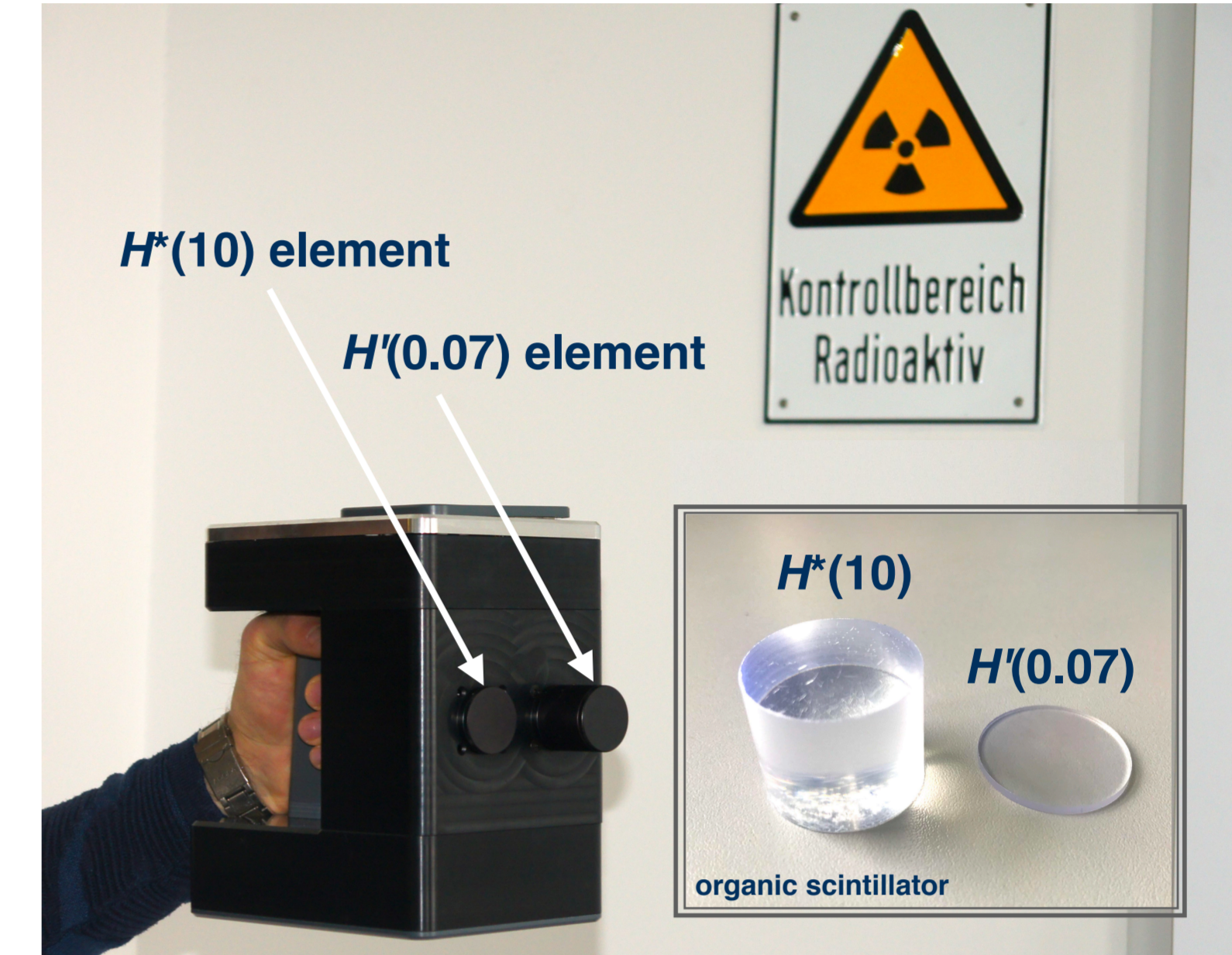
# Dose Rate Measurements in Pulsed Radiation Fields by Means of an Organic Scintillator

Theresa Werner, Roland Beyer, Richard Biedermann, Dirk Döhler, Marko Gerber, Jürgen Götze, Philipp Herzig, Vincent Melzer, Elena Metzner, David Weinberger and Thomas Kormoll

## Motivation

- Development of a portable, battery powered detection system for dose rate measurements in pulsed radiation fields
- Real time dosimetry and evaluation of radiation protection quantities  $H^*(10)$  and  $H'(0.07)$
- Challenges: high detector load in combination with short radiation pulses

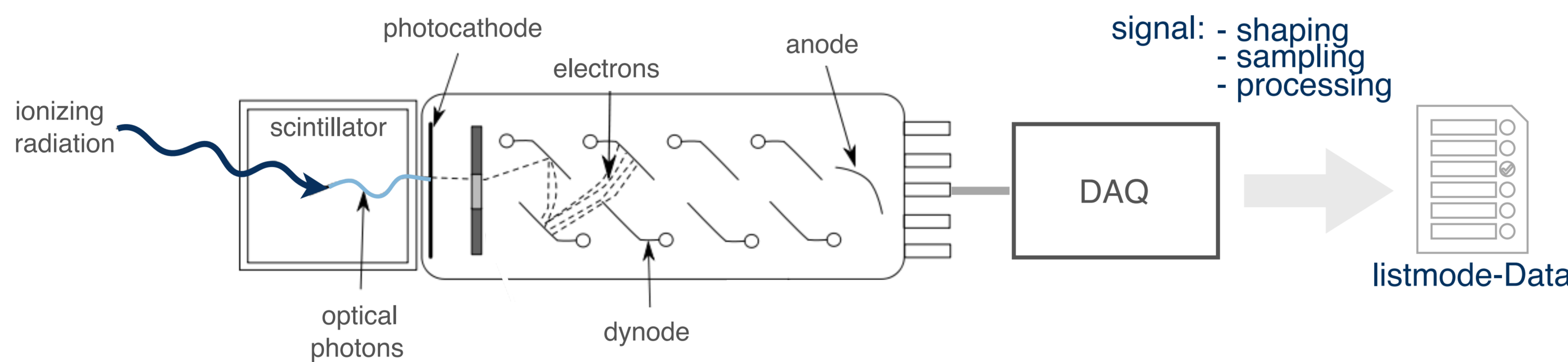
prototype of a dose rate measuring device



## Materials and Methods

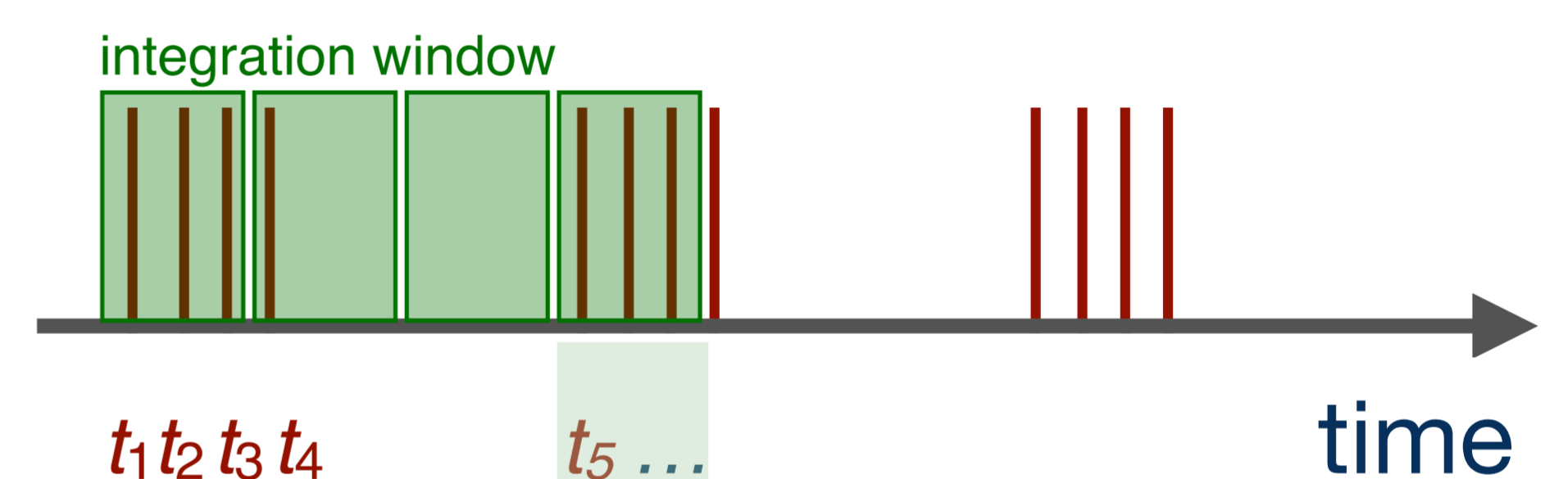
- Event signal is proportional to the deposited energy → free running ADC with 125 MHz, 14 bit

### detection principle

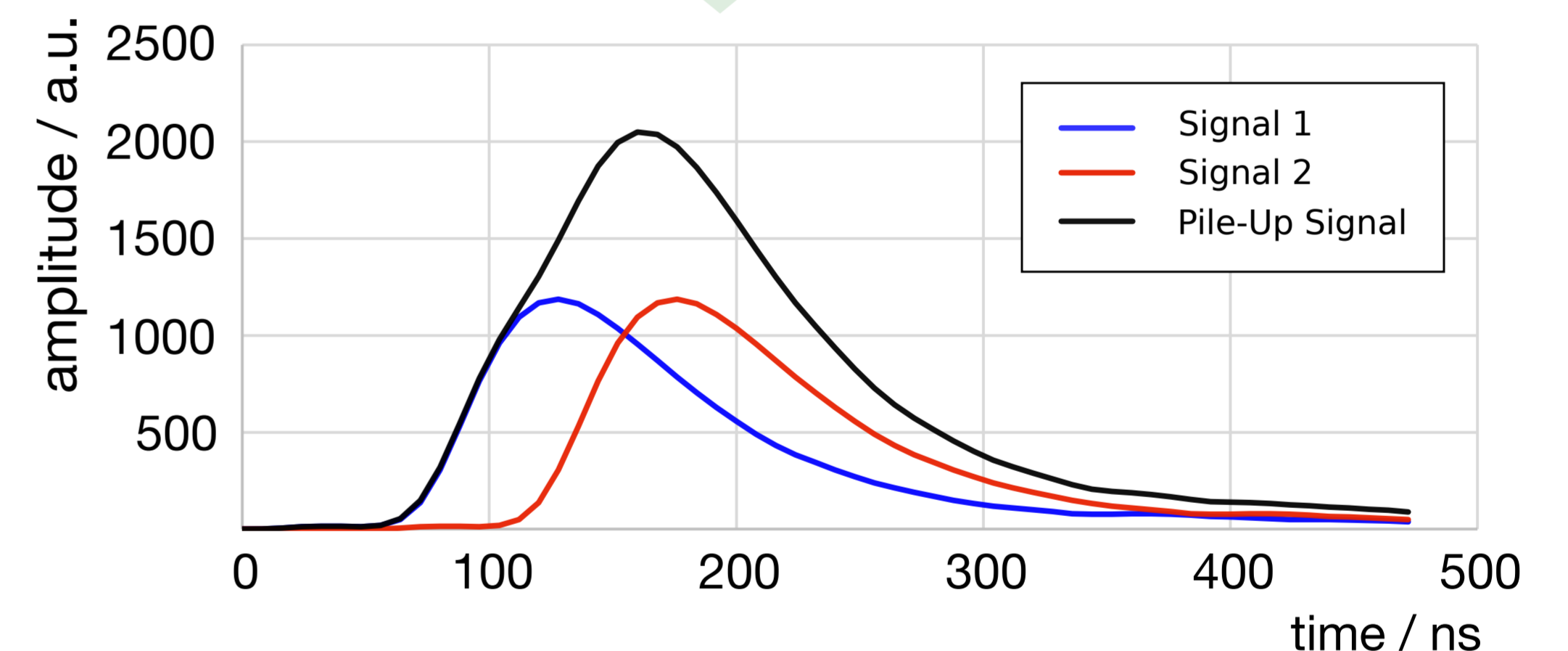


- Event-by-event measurement with corresponding energy deposition and timestamp
- Non-paralysable dead time (continuous integration window)
- Pile-Up: resulting signal is proportional to total energy deposition → tissue equivalent detector material

pulsed radiation

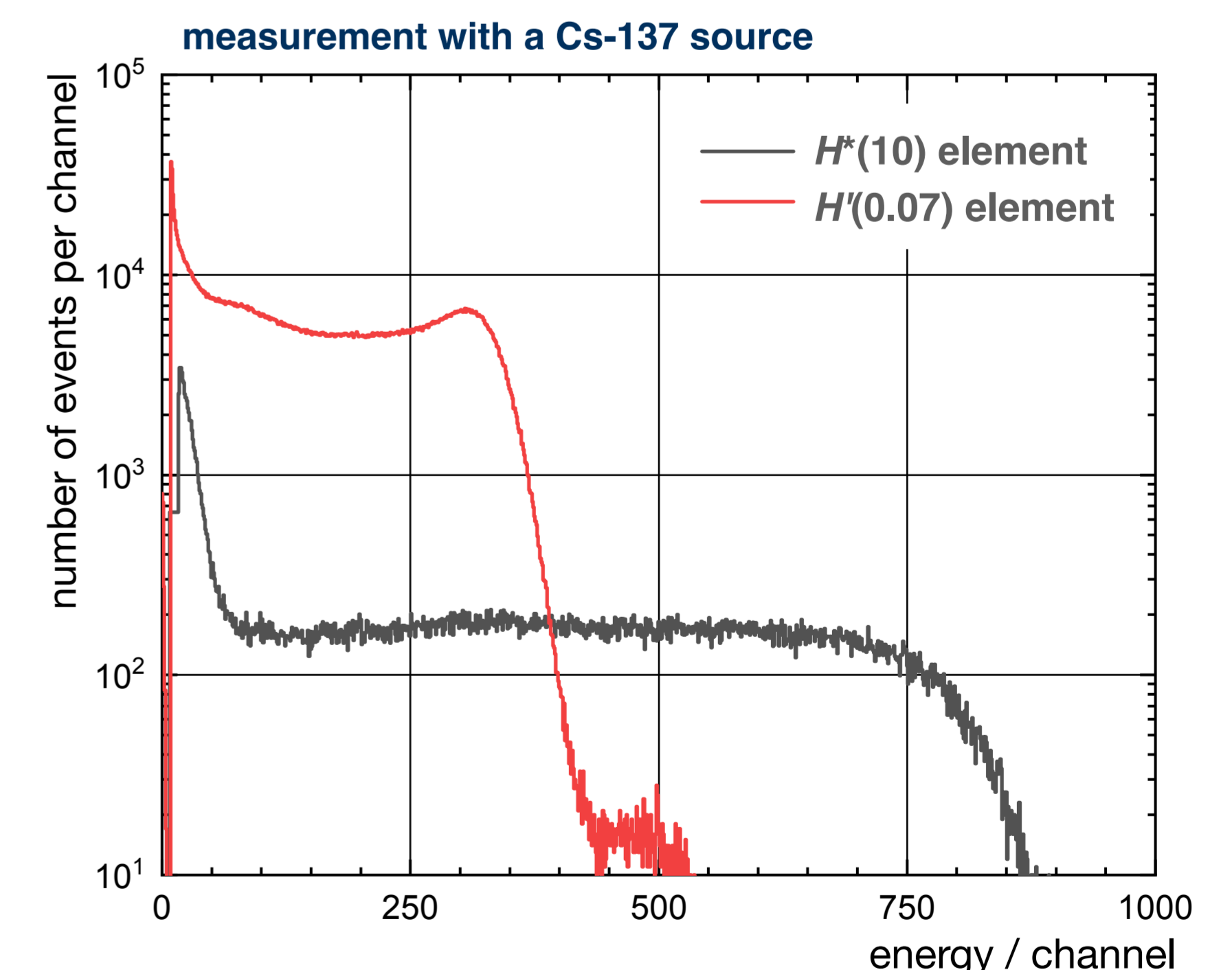
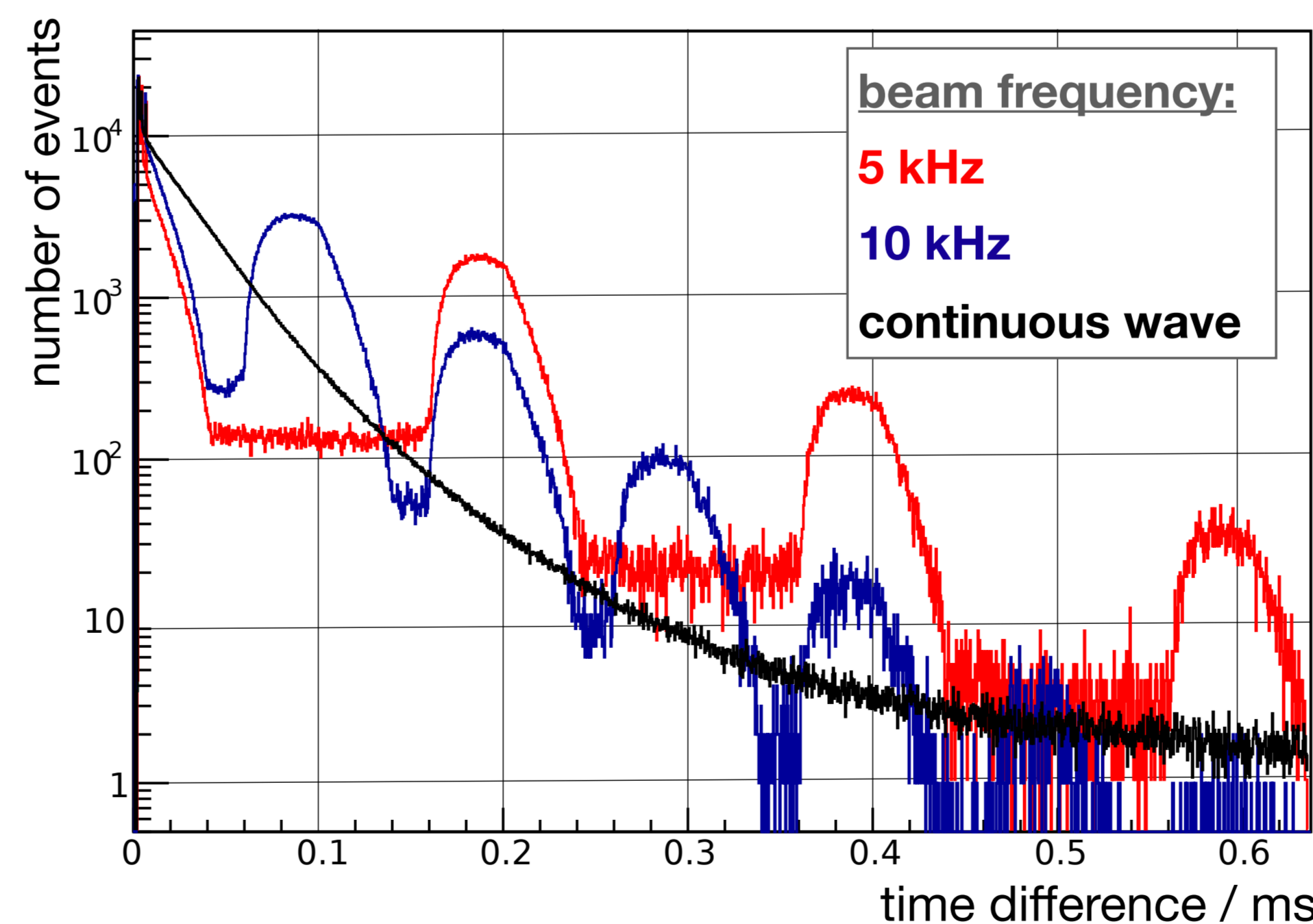


event signals



## Results

- First tests in pulsed radiation fields (ELBE, HZDR [1])  
pulse duration: 40  $\mu$ s  
frequency: 5 kHz / 10 kHz / cw
- Reconstruction of time structure of the photon beam [2]



## Summary & Outlook

- Portable prototype is operational → calibration in low energy photon region needed [3]
- Test in pulsed radiation fields (medical facilities, laser machining system)