Digitizers for neutron measurements

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IRMM

EFNUDAT JRA1, February 2008, progress report IRMM

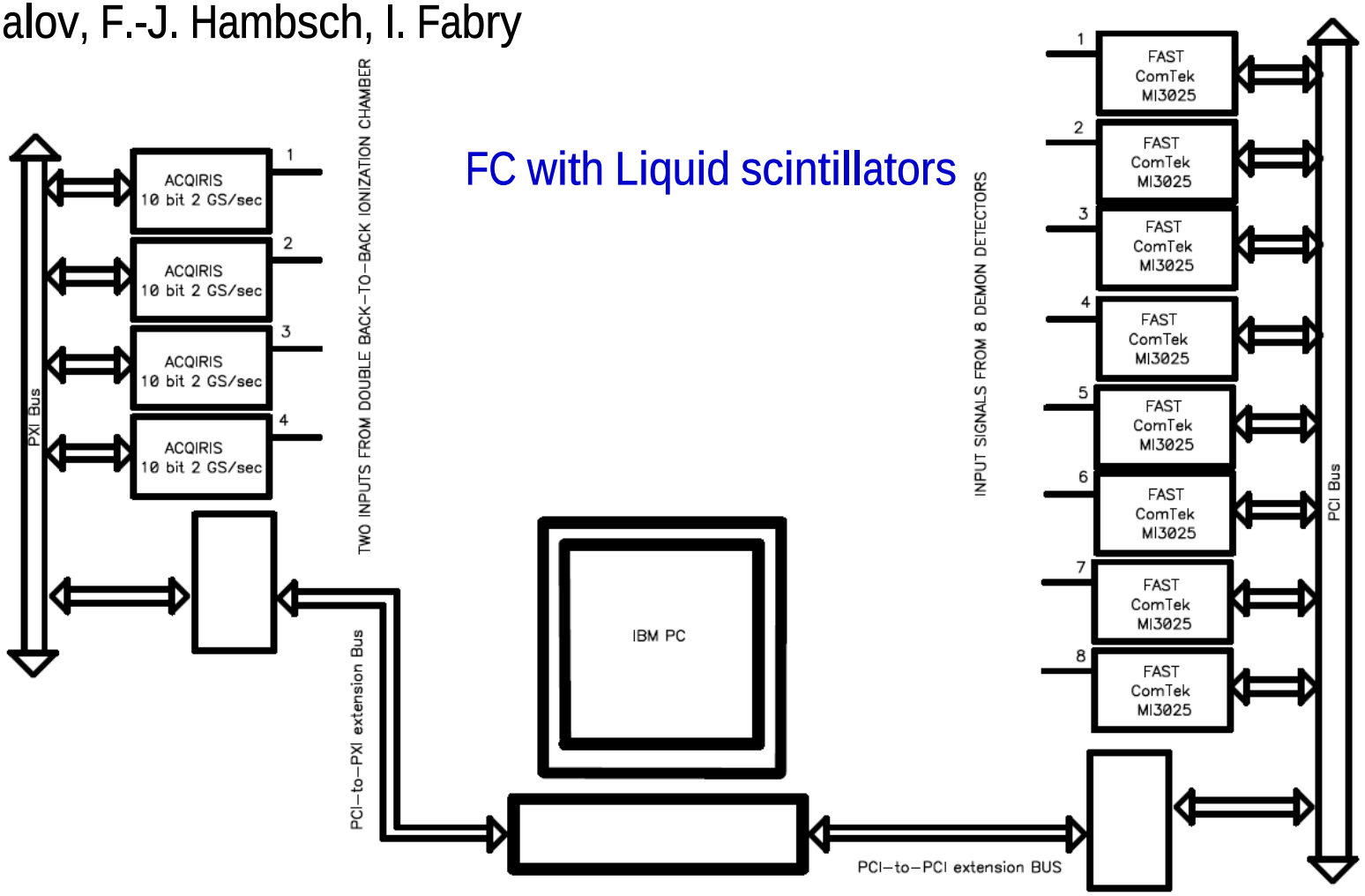
Overview IRMM involvement

- GELISCOPE
- Method implementation, development and testing
  - 8-bits oscilloscope and HPGe detector
  - Digitizers for capture measurements at GELINA
  - Dataprocessing and acquisition with GENDARC

GELISCOPE data acquisition program

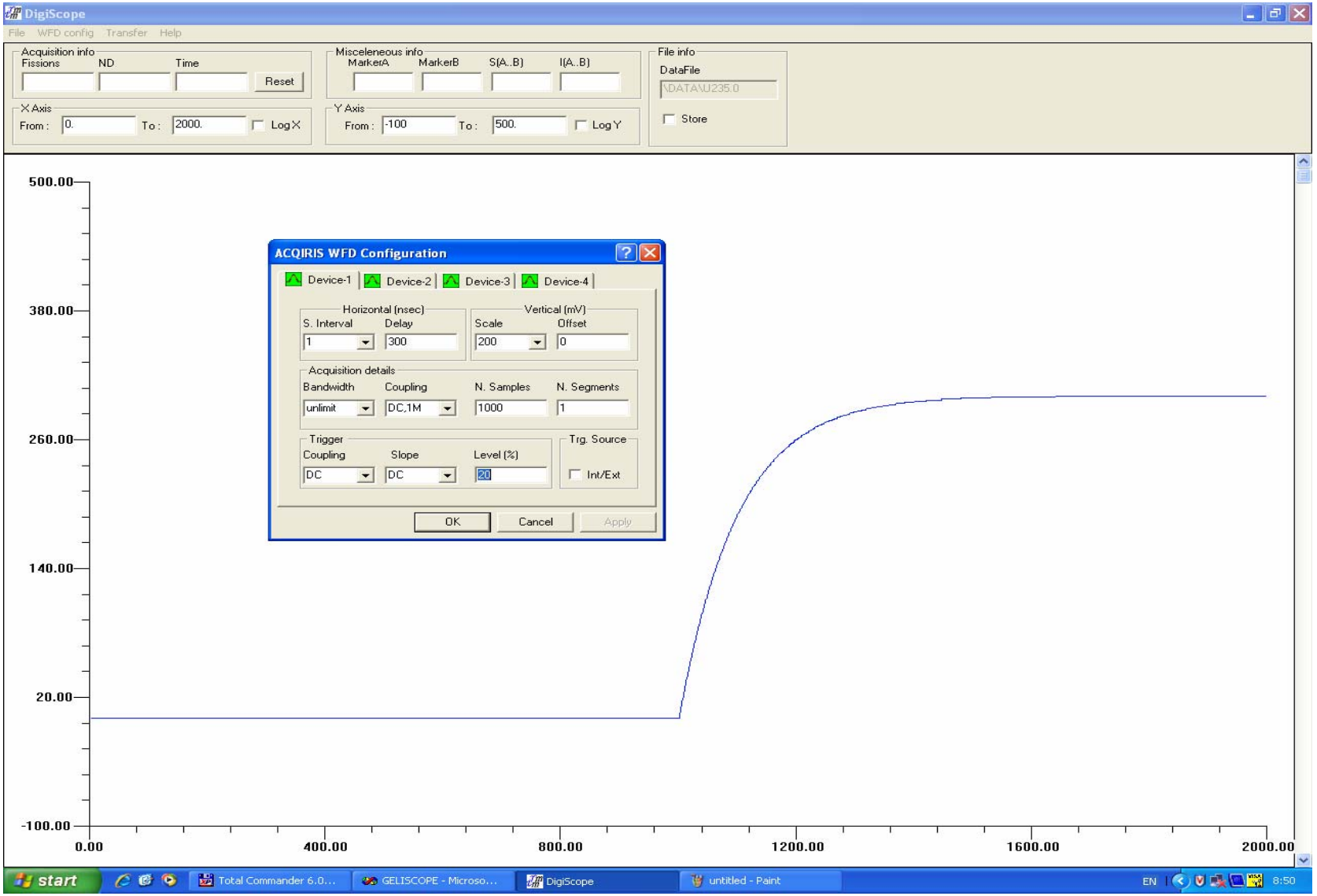
Block diagram of a PC-based heterogeneous data acquisition system

S. Zeynalov, F.-J. Hambsch, I. Fabry



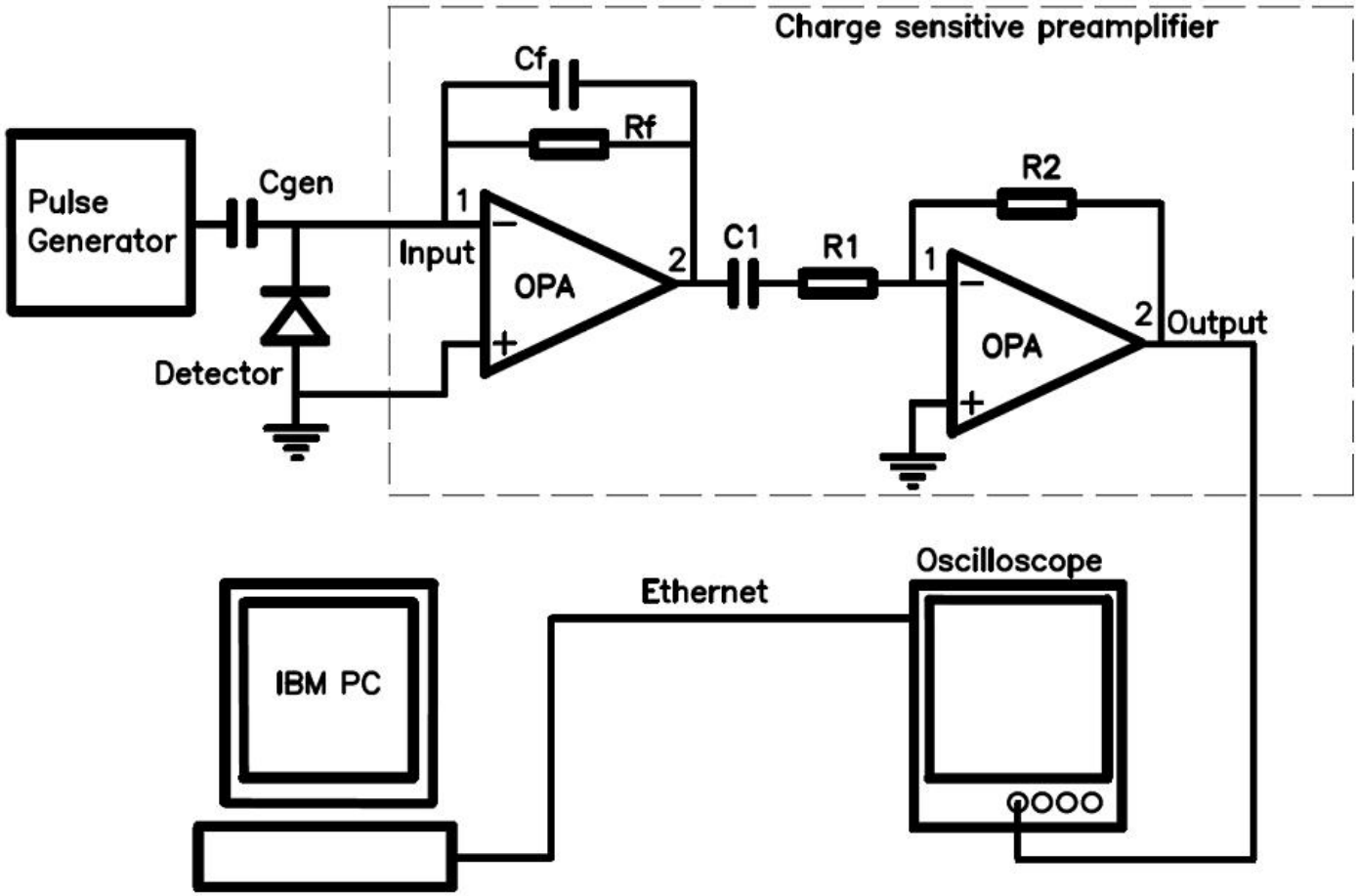
GELISCOPE data acquisition program

Screenshot



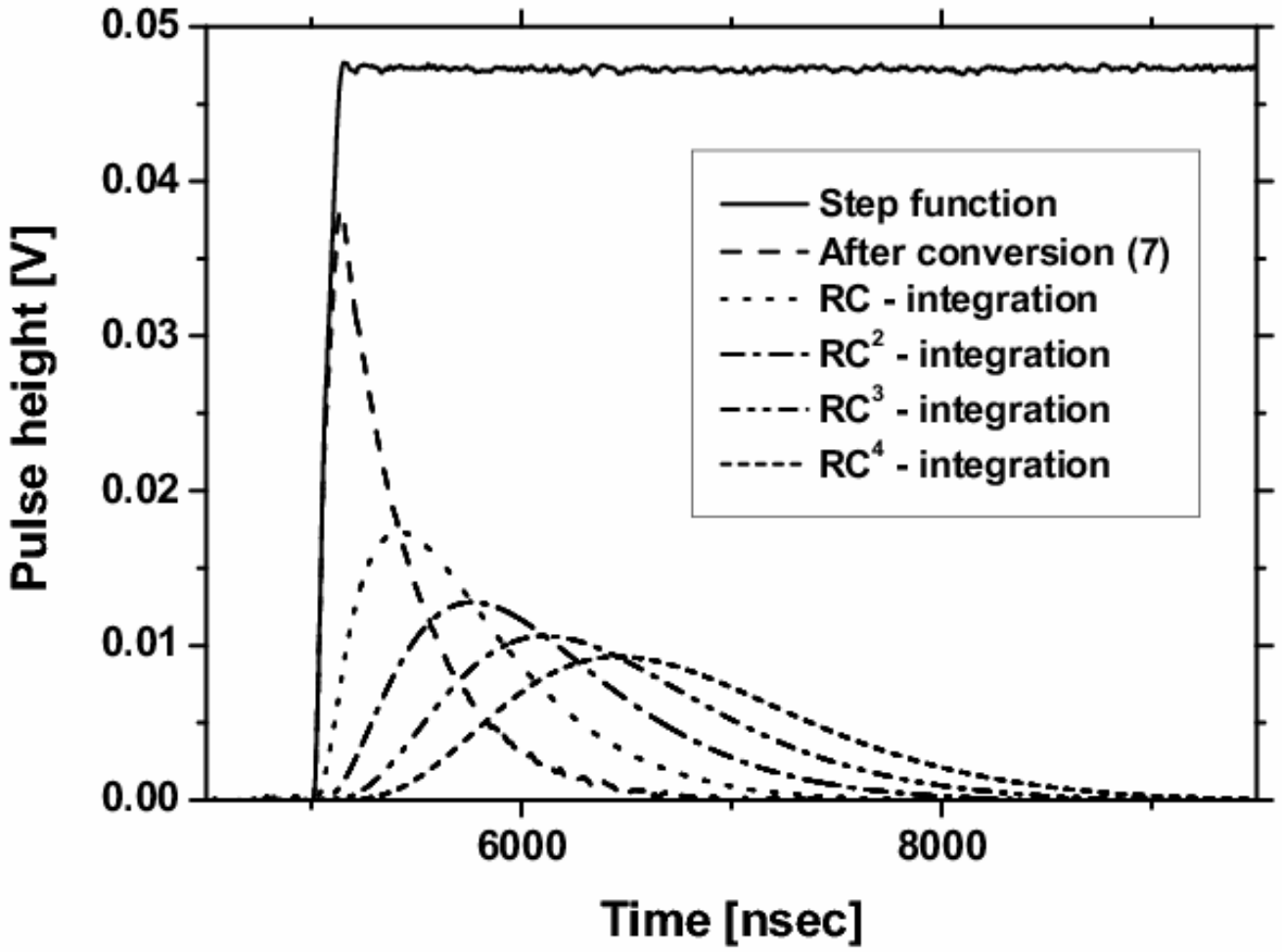
DSP application to charge sensitive pre-amplifier

Block diagram of an experimental setup with a TDS3054B digital oscilloscope



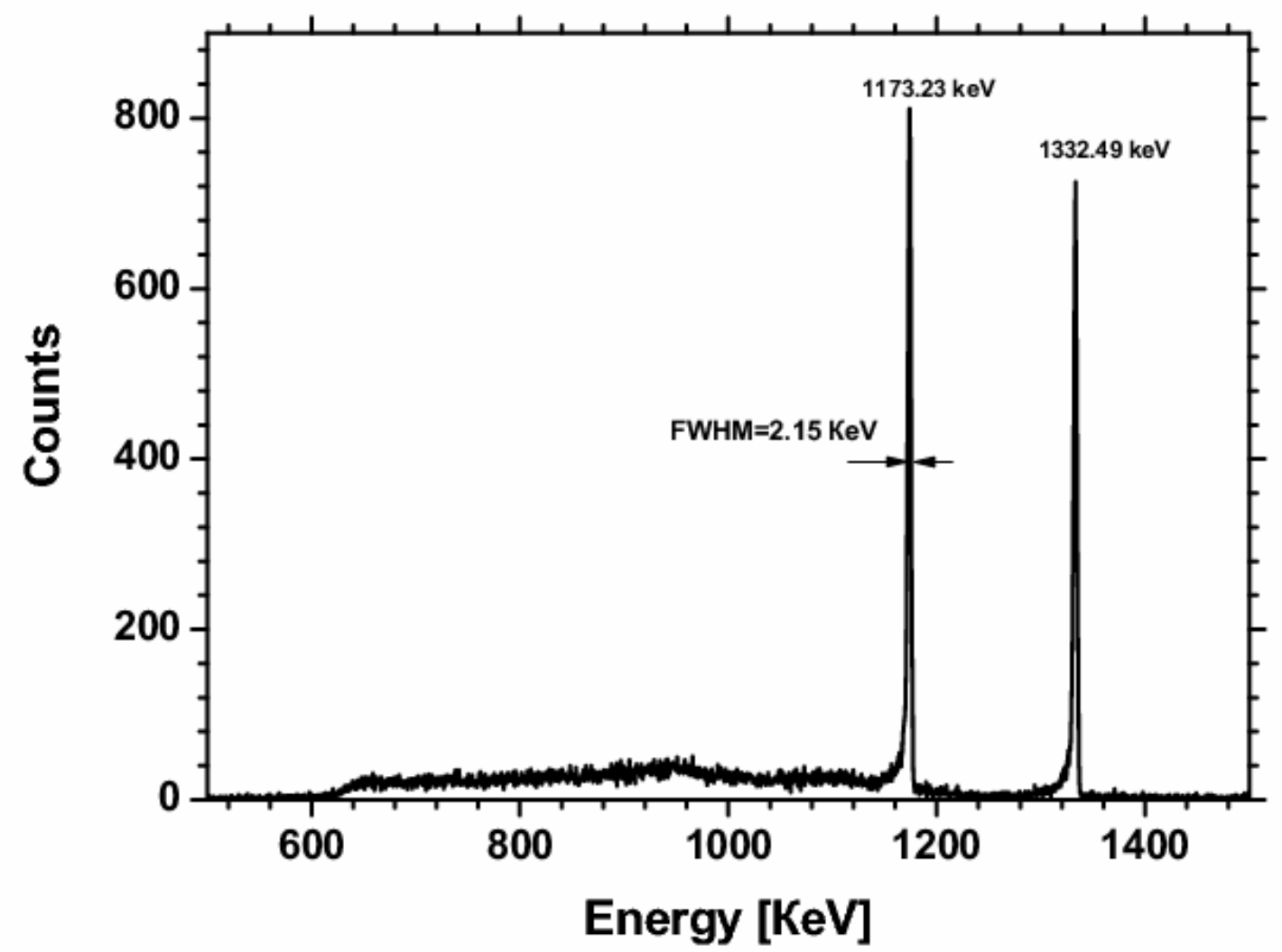
DSP application to charge sensitive pre-amplifier

Passage of a step like function through CR-RC^4 filter

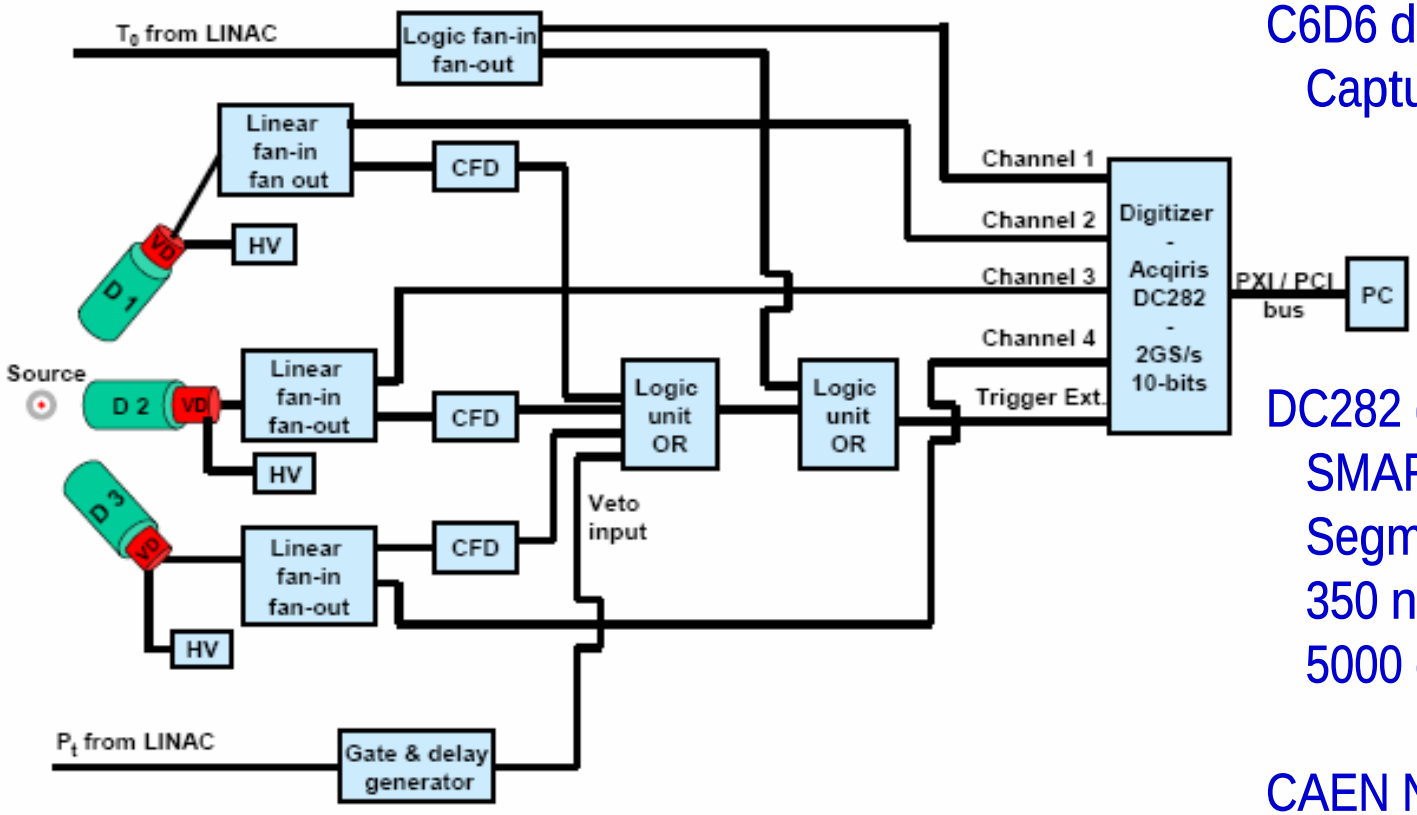


DSP application to charge sensitive pre-amplifier

Resulting ^{60}Co spectrum



Digitizers for capture measurements



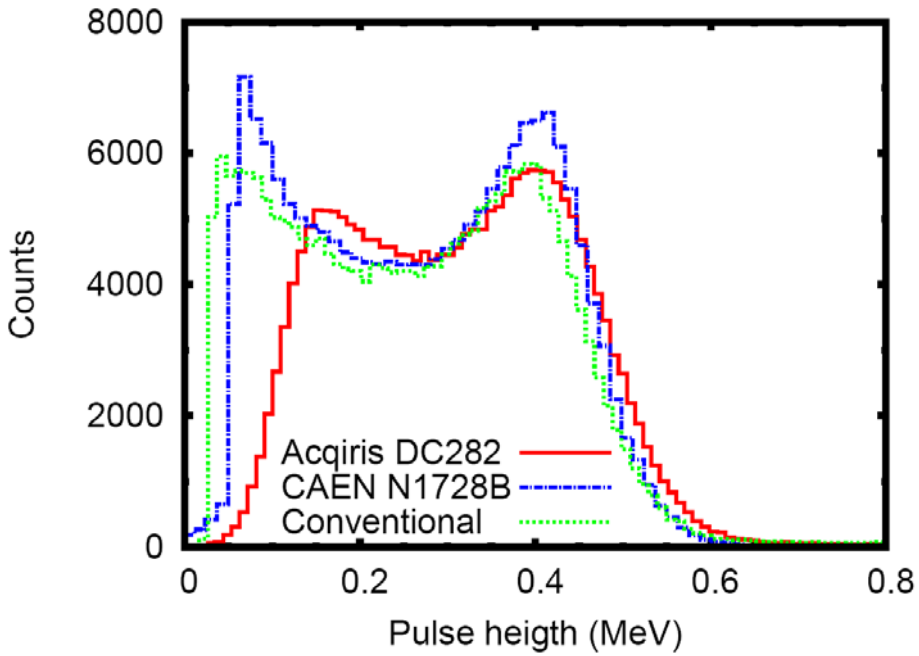
Cristian Mihailescu

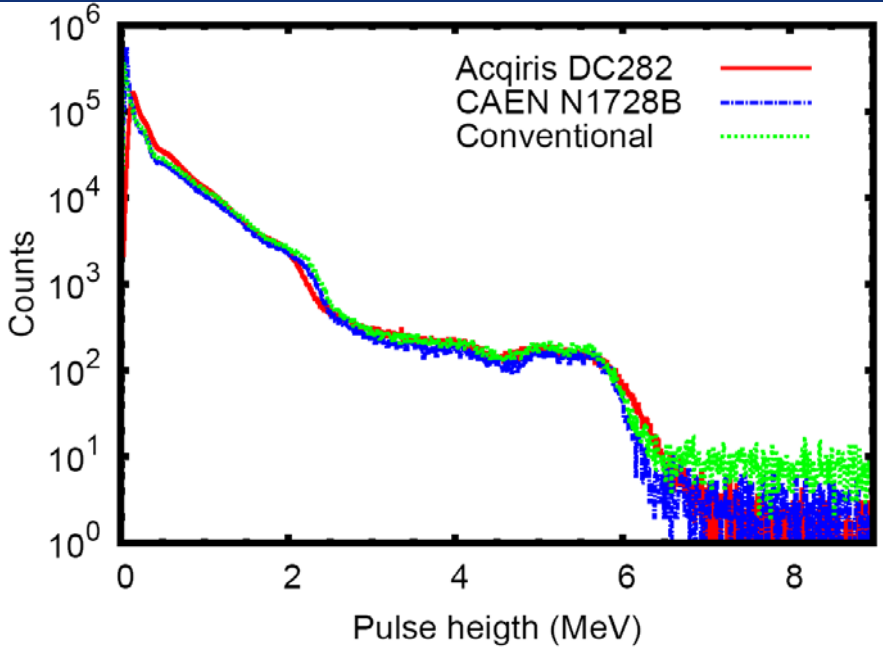
C6D6 detectors
- Capture measurements

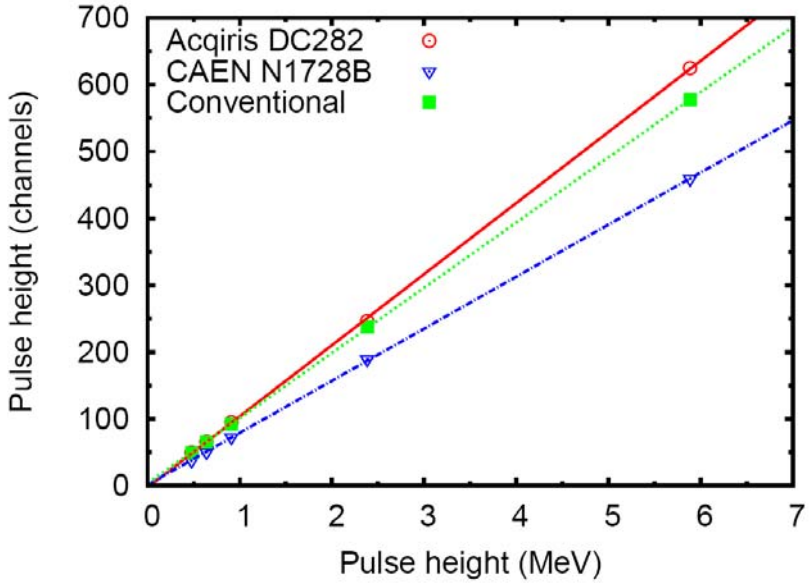
DC282 (10b, 0.5ns/s)
- SMART option
- Segmented mode
- 350 ns deadtime, rearming
- 5000 cps, full throughput

CAEN N1728B (14b, 10ns/s)
- PH+time-stamp: FPGA
- Firmware parameter setting
- No further electronics

PH response and linearity







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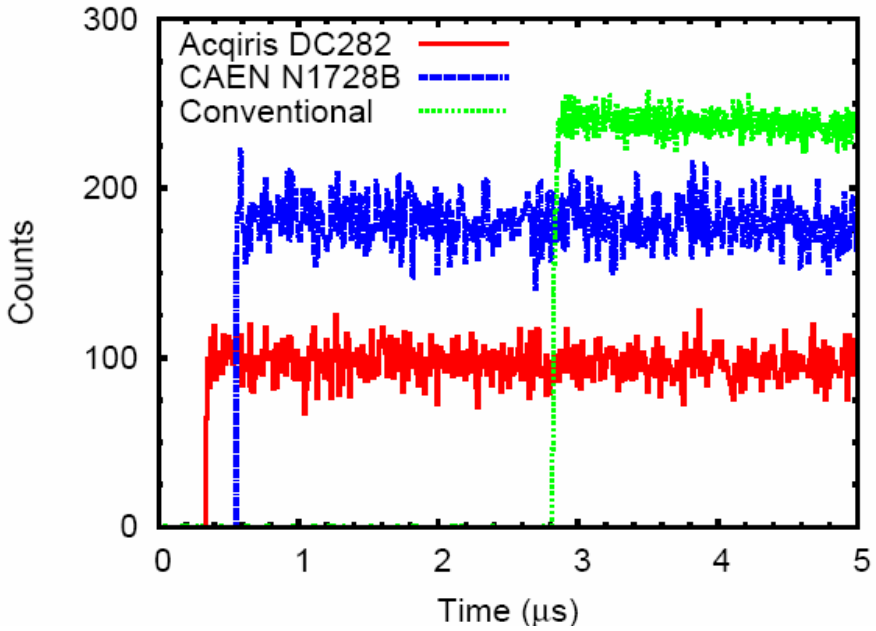
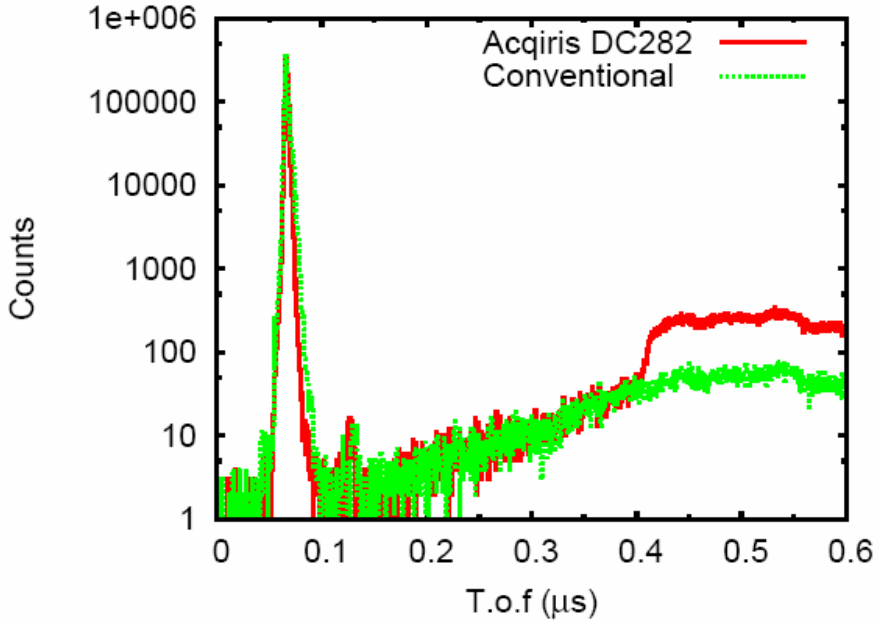
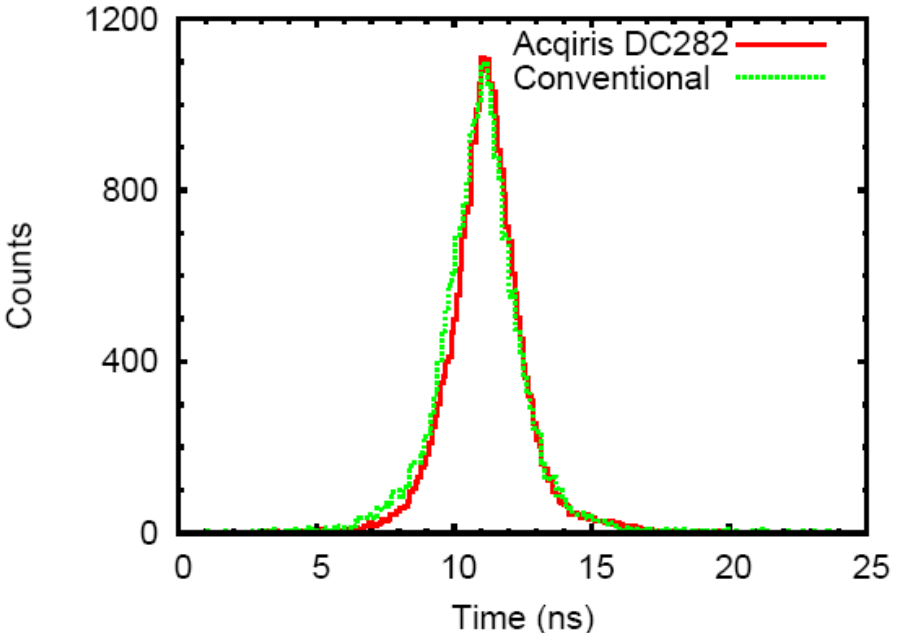
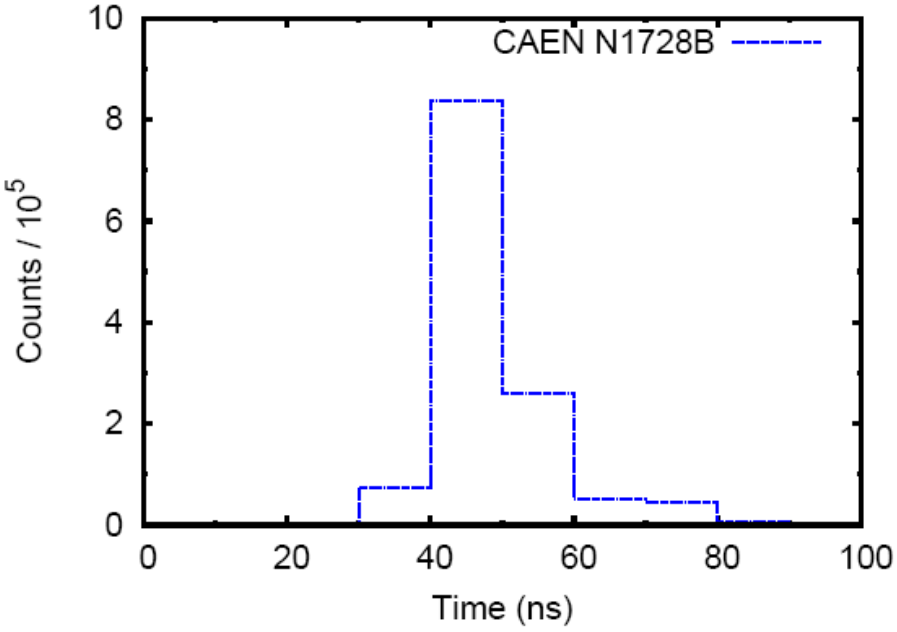
Dead time and time resolution

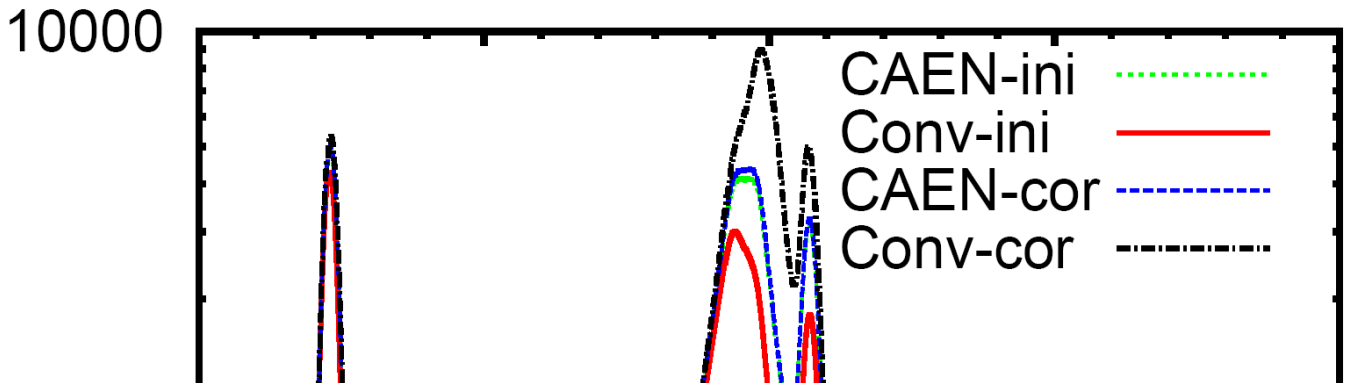


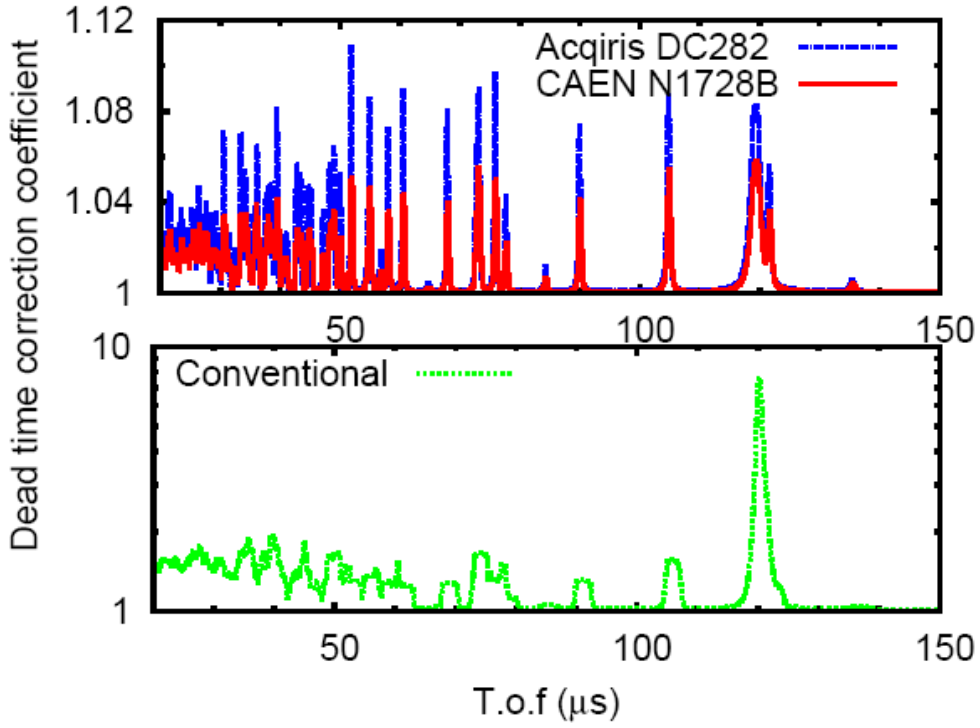


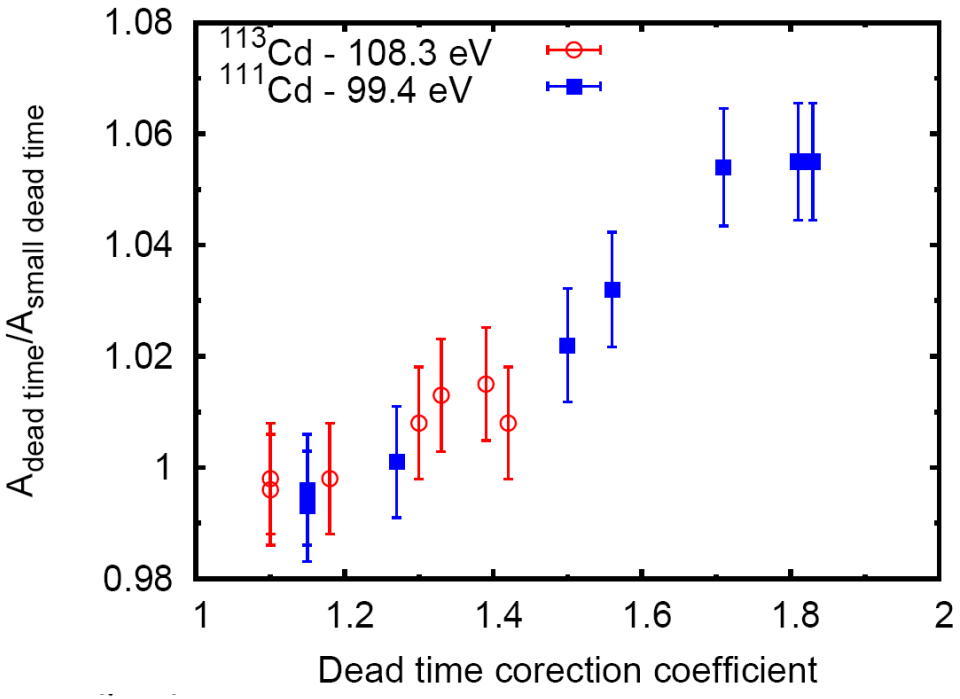




Dead time correction factor (Au, Cd)

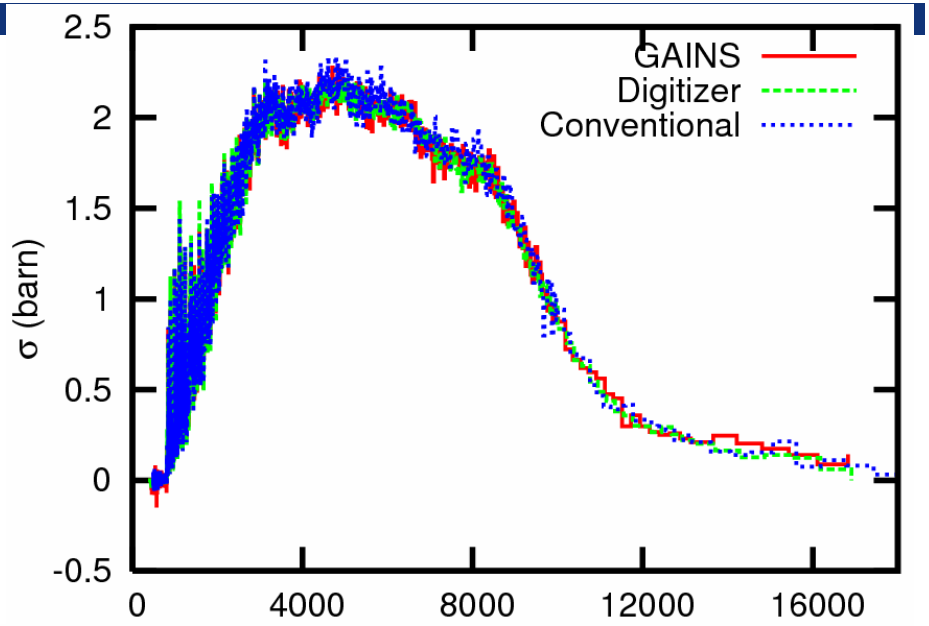


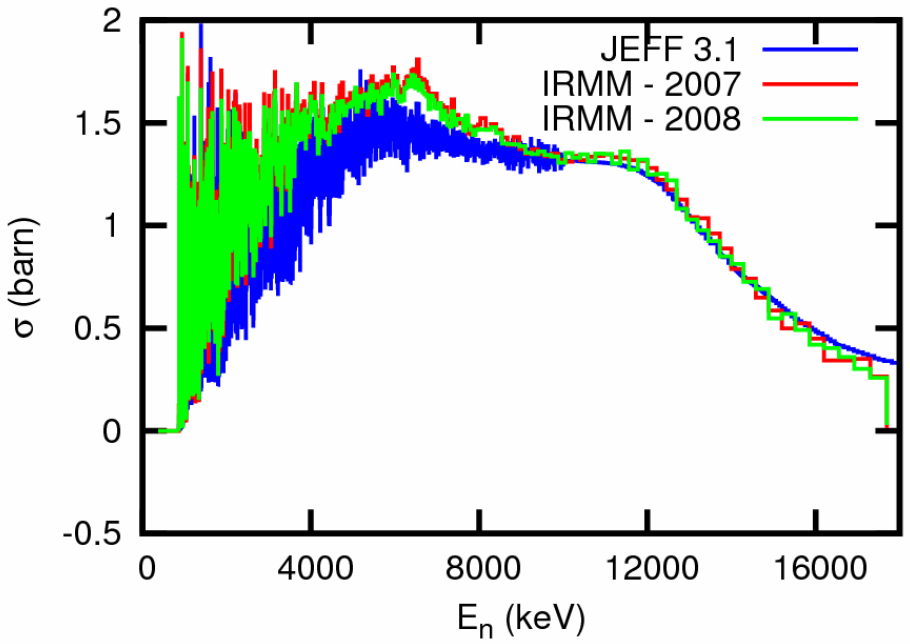




GAINS installation and testing

Alexandru Negret





GENDARC: The GEel Neutron Physics Data Acquisition, Analysis and Run Control program

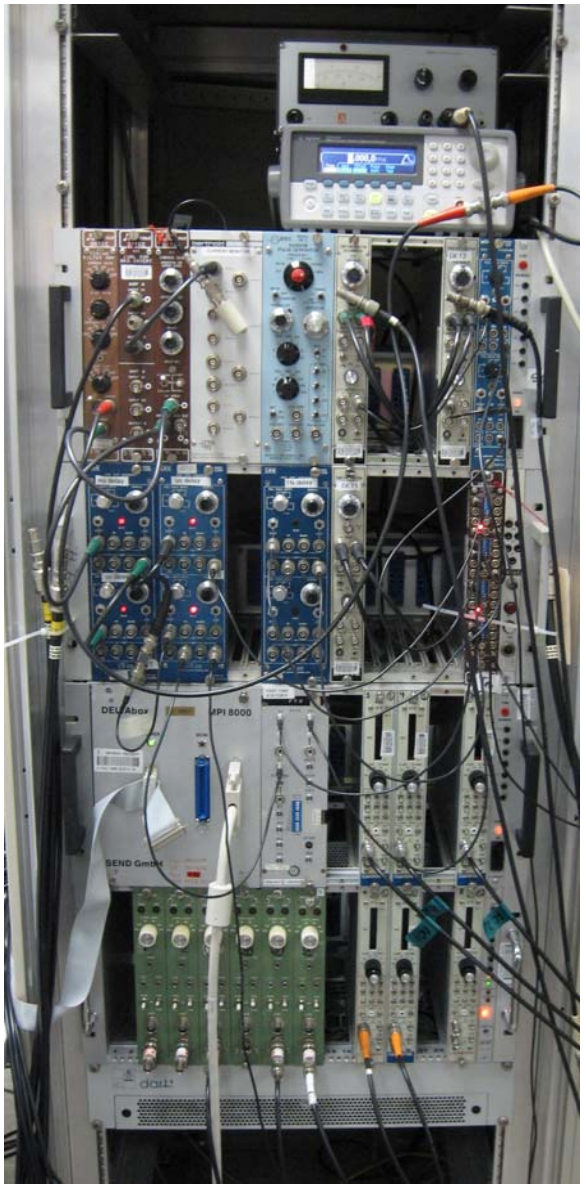
Imrich Fabry

Neutron Physics Unit

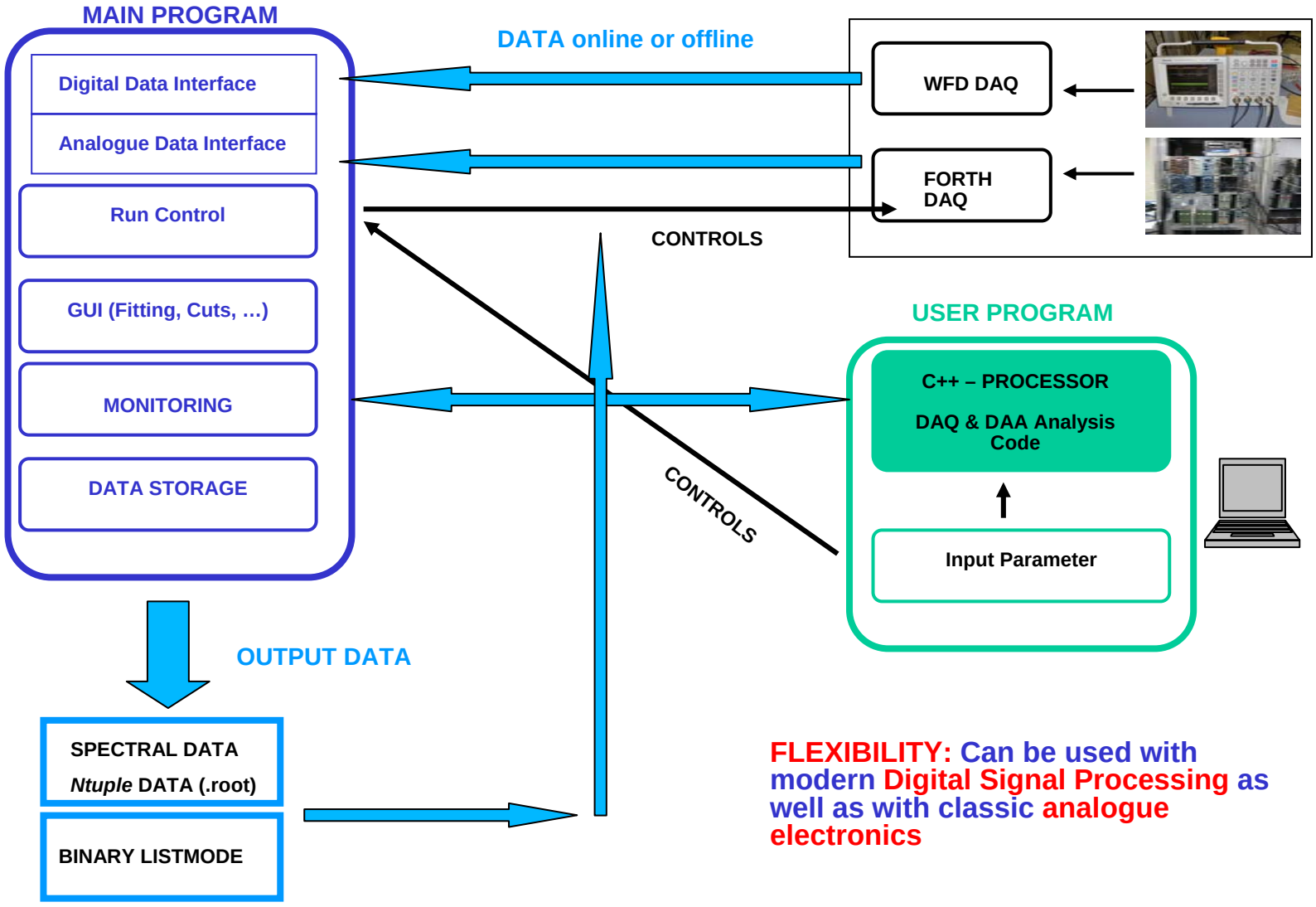
GENDARC based on ROOT

GENDARC basic features:

- GENDARC provides compatibility to older software applications at IRMM
- C++ - program code
- Running on major platforms Solaris UNIX, Linux and Windows XP via Cygwin
- Open-source
- Connected to MPI 8100 Multi-Parameter-Data Acquisition-Interface



GENDARC Structure



FLEXIBILITY: Can be used with modern Digital Signal Processing as well as with classic analogue electronics

GENDARC Attributes (examples)

GENDARC provides numerous features:

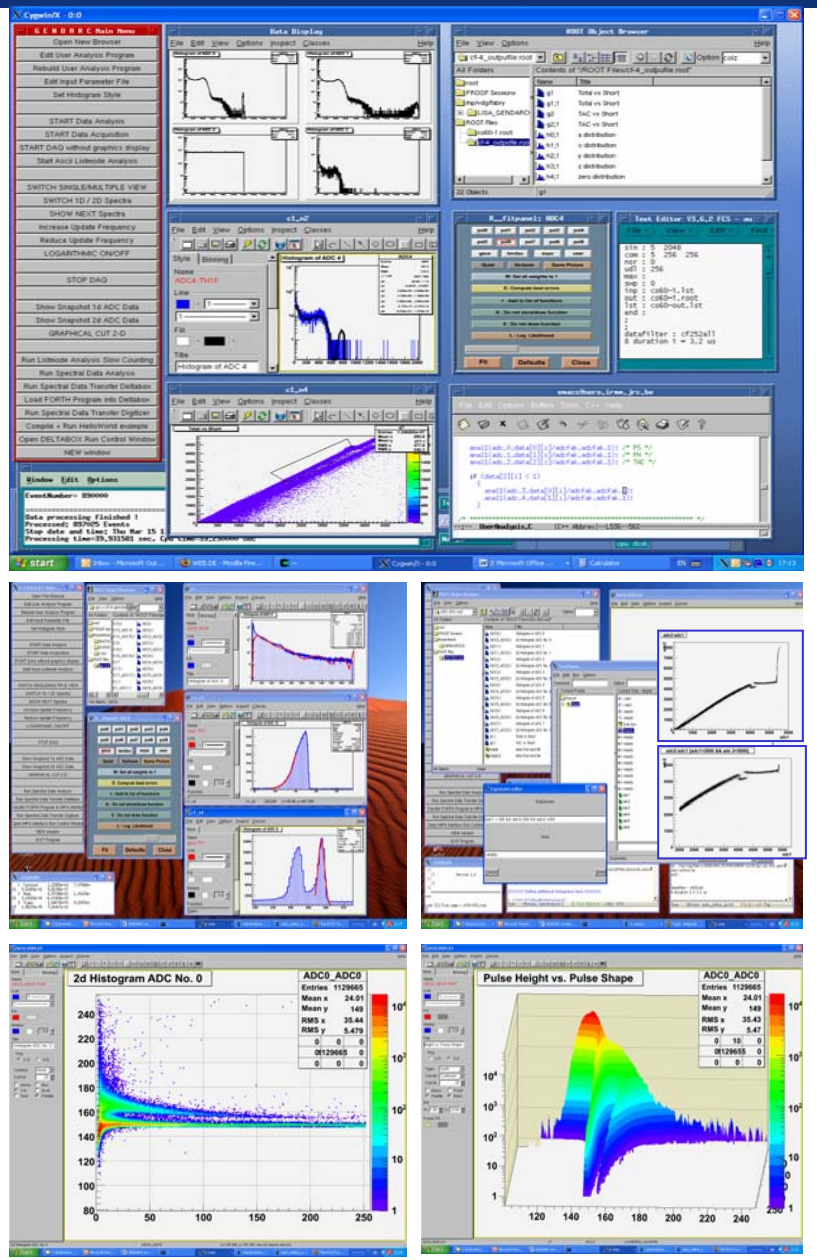
- Modern GUI for program control, start, stop, changing display, zooming, etc. for 1D / 2D data visualisation

Use of *NTUPLEs* data objects:

  - **Complicated n-dimensional analytical cuts possible**
  - **Raw Data Reduction (factor 2 !)**

- Graphical cuts in 2D - data
- Tools for fitting functions (polynomials, gauss, landau, etc.) to spectra
- Publication-quality output in numerous formats (jpg, pdf, eps, ps, gif,..)

First successful tests online/offline within our ^{235}U PFNS experiment



GENDARC Summary and Outlook

GENDARC based on ROOT is being developed

- Data acquisition & Data analysis within unified framework
- Run Control, Online Monitoring, state-of-the-art tools for data processing designed to ensure high quality of data
- Flexibility for new measurement methods: Can be used with classic analogue electronics as well as with modern Digital Signal Processing
- Open source software modules used exclusively
- New software interface enables to re-use all existing data analysis programming code developed over the last decade

NEXT STEP: Implementation of DSP software library

Contact: *Imrich.Fabry@ec.europa.eu* Please feel free to contact me!