

Readout Electronics for high-count-rate high-resolution X-ray spectroscopy

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Products



Hybrid Electronics



ASICs



Instrumentation

Services



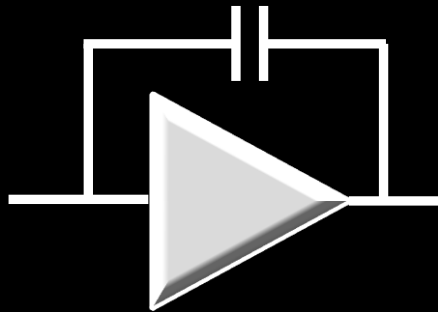
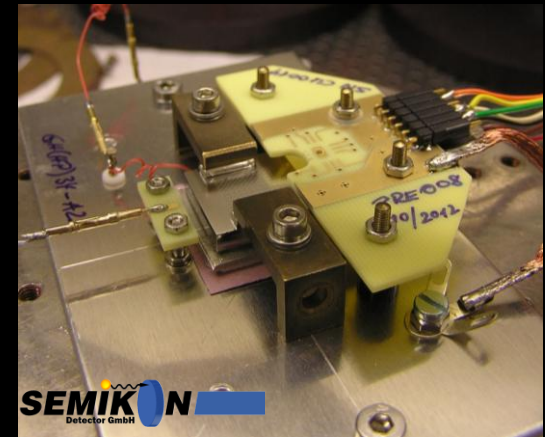
Custom Systems



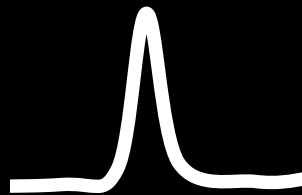
Consultancy

Expertise

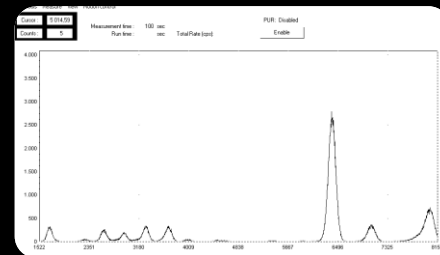
Detector



Low Noise Front-End



Processing and MCA



Software

SUMMARY



CUBE: new Front-End readout for detectors



DPP: High Rate X-ray spectroscopy (digital shaping)

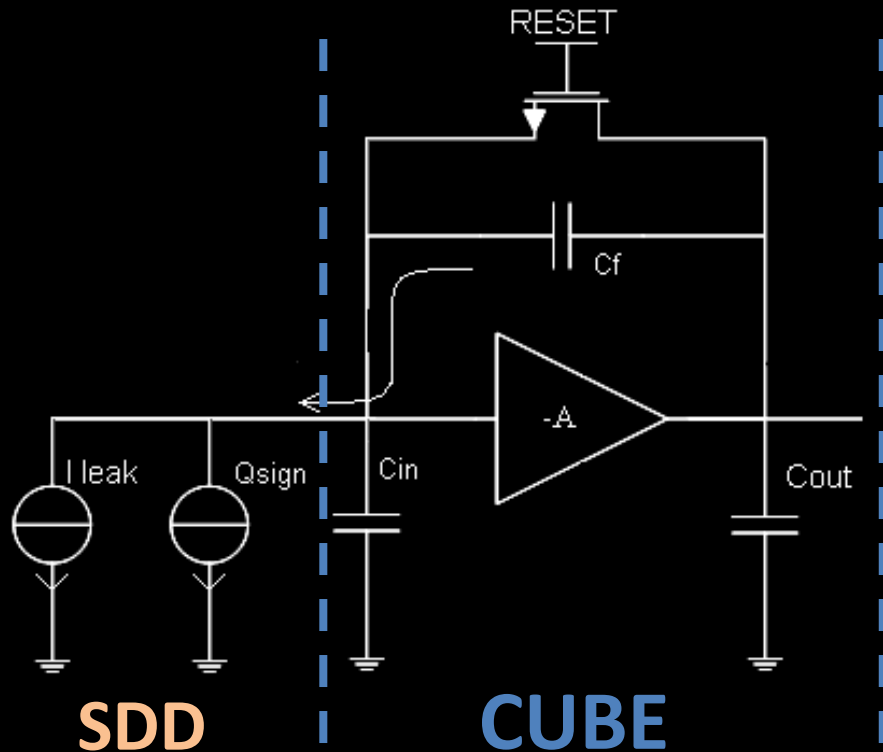


VERDI-3: Versatile Electronics for Multichannel systems



ASICs: CUBE

A full CMOS preamplifier can
replace the single front-end JFET

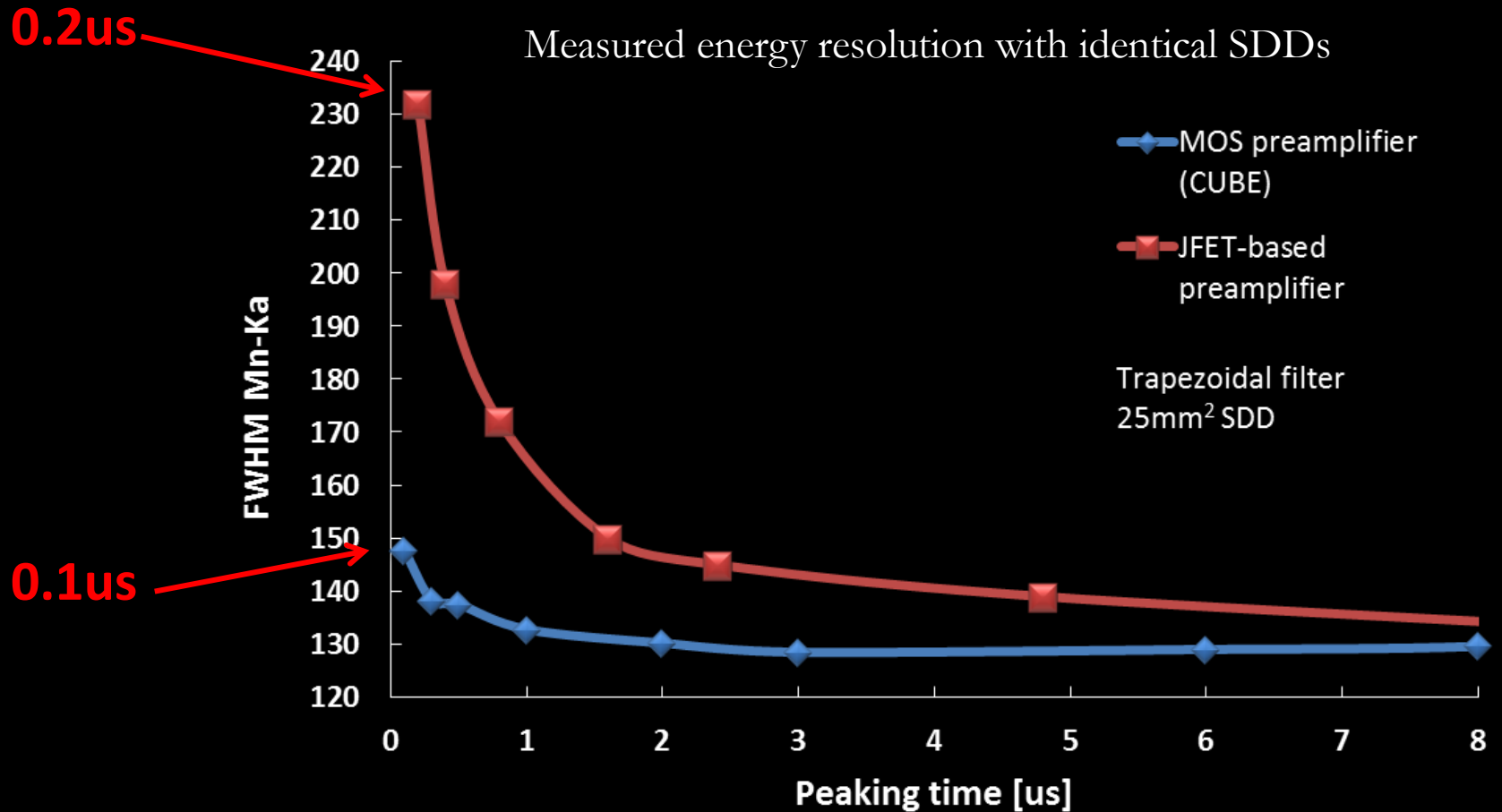


Advantages:

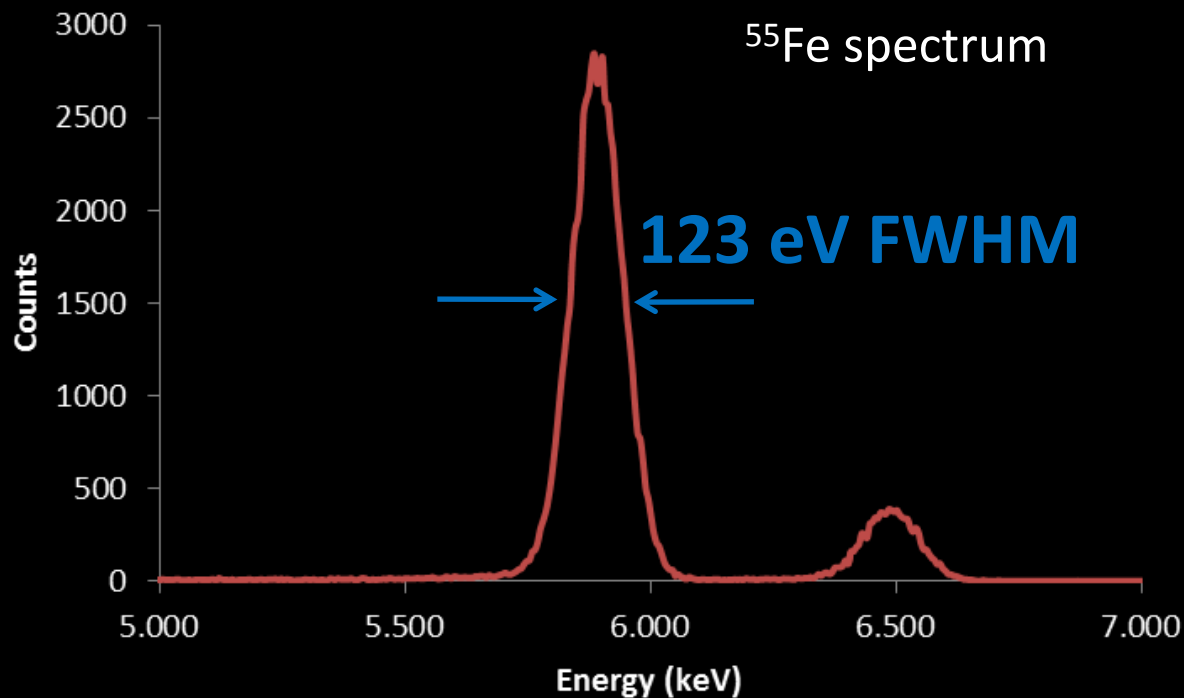
1. High signal level at the output of the module.
2. No sensible loop outside the module.
3. Possibility to drive “long” connection.
4. Preamp Compactness
5. Superior performance respect to all the front-end JFET available at short shaping time.



Comparison with available JFET



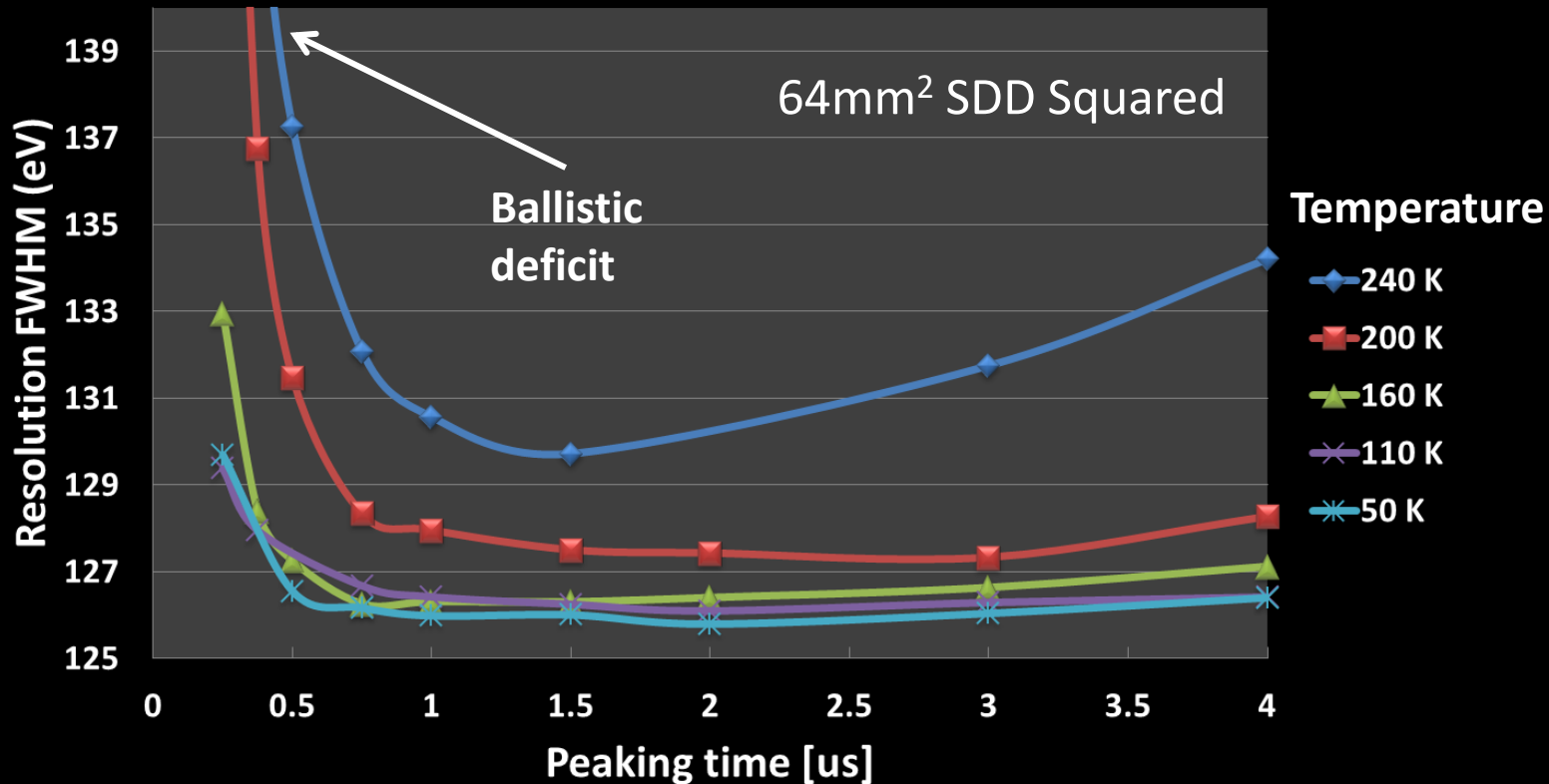
Spectroscopy performances of CUBE connected to a SDD



**1 μs shaping time
(optimum)
ENC = 3.7e- rms**

Commercial analog shaper:
7th-order Semi-Gaussian
complex-pole

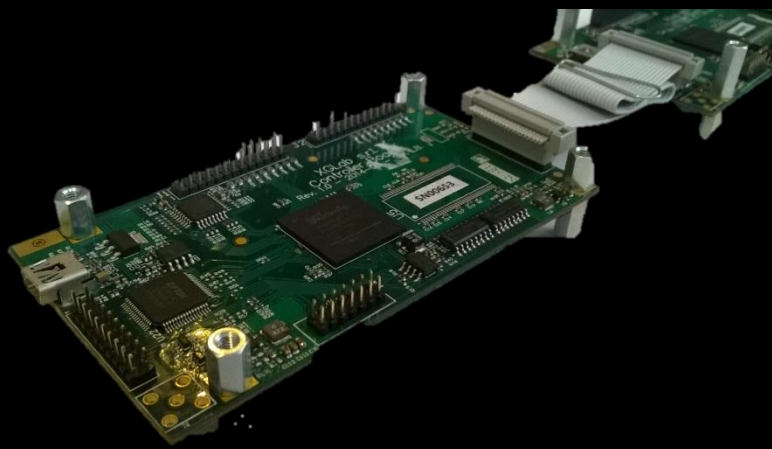
Spectroscopy performances of CUBE connected to a SDD



No worsening at cryogenic temperature



CUBE also suited for HPGE, SiLi and RTD



Digital Pulse Processor Platform



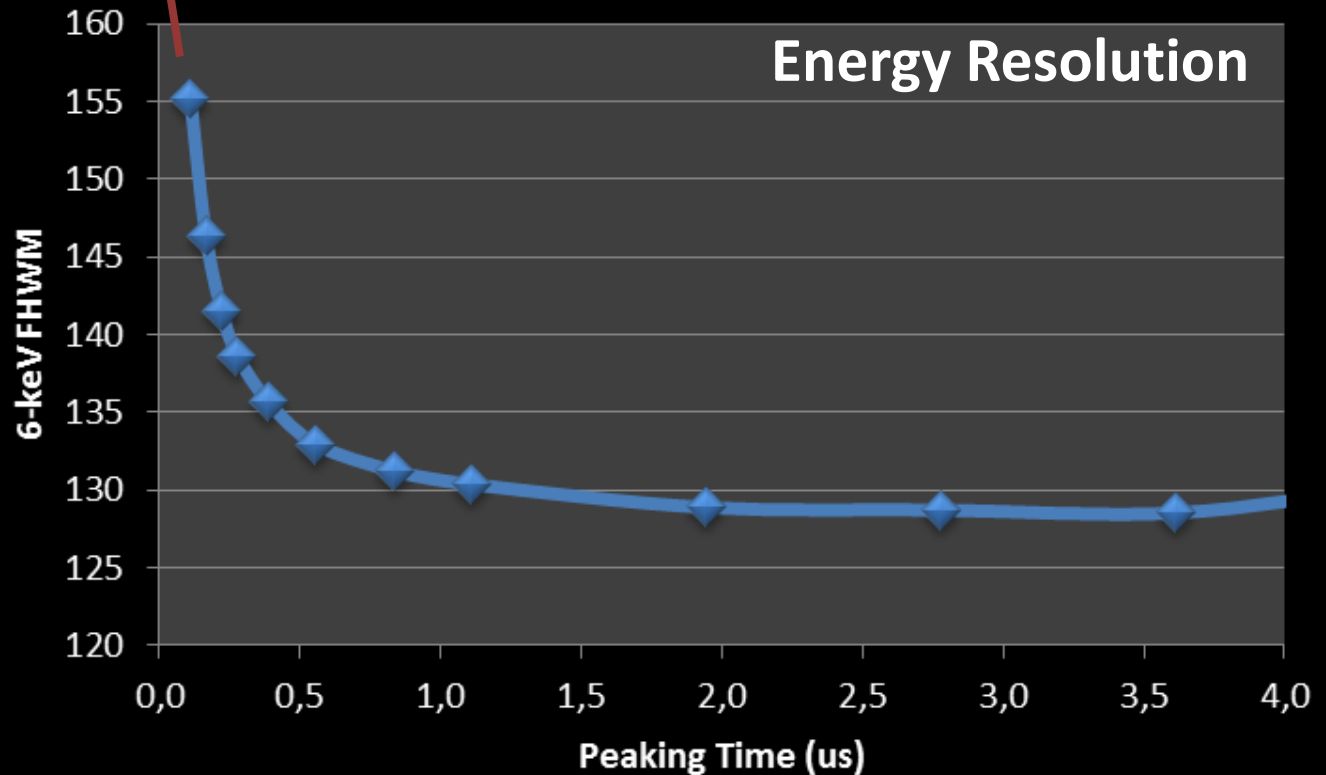
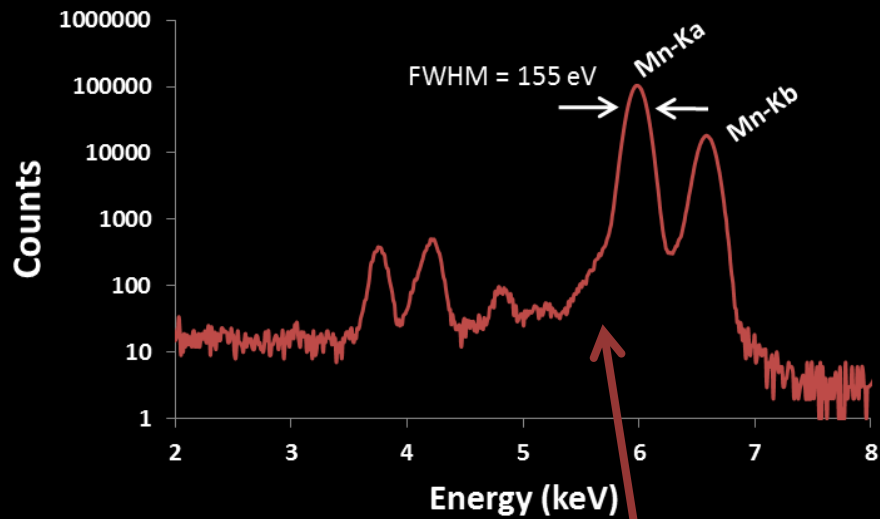
Optimized for CUBE

- Input stage optimized for CUBE output (dynamic range, gain, etc...)
- Provide best possible energy resolution
- Provide good performance at fast count-rate (peaking down to 120ns)
- Handle very high input count-rate (ICR up to 3Mcps)



US patent: 7763859, 8039787,
7855370, 7807973

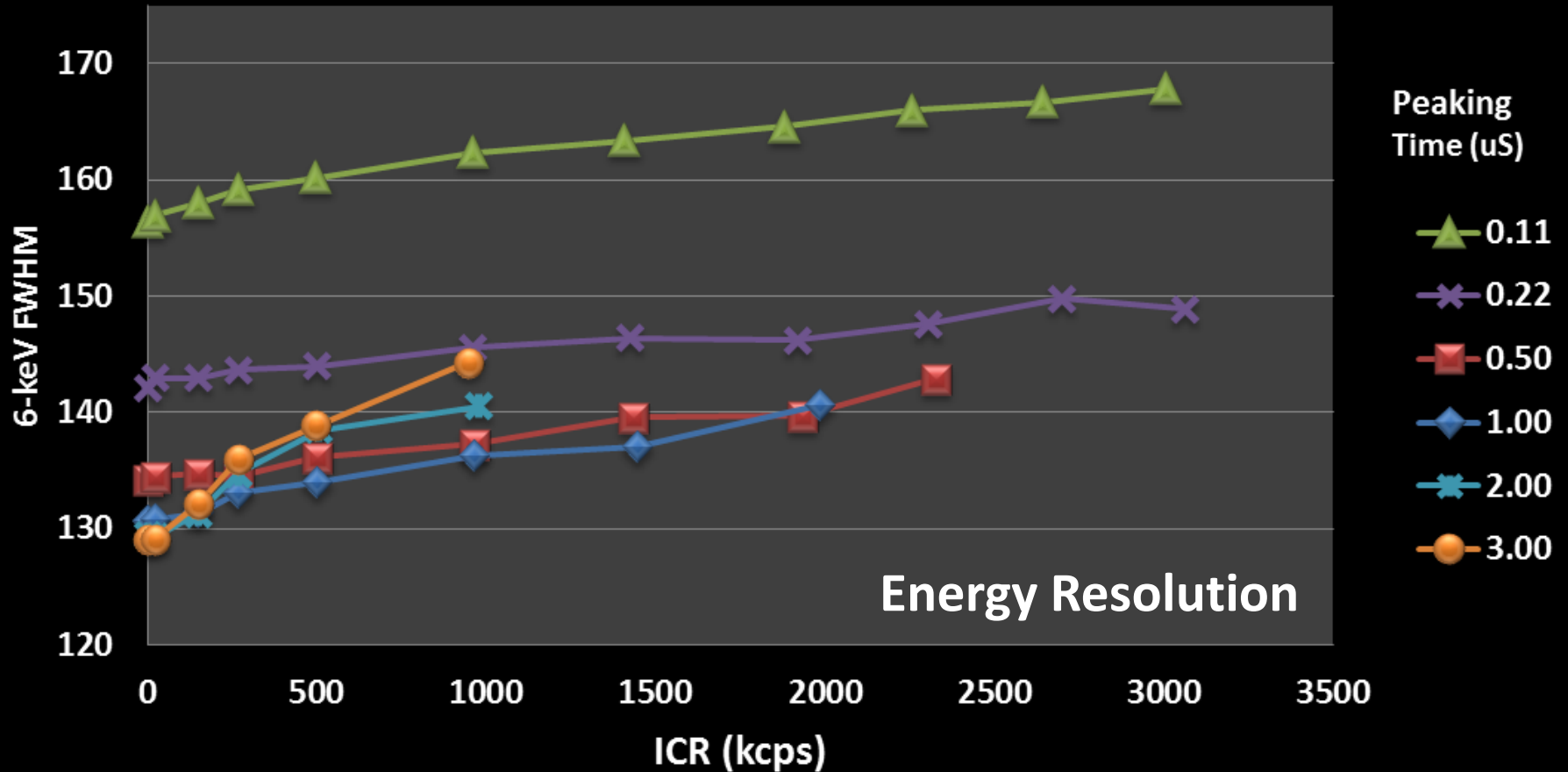
CUBE + DPP performances

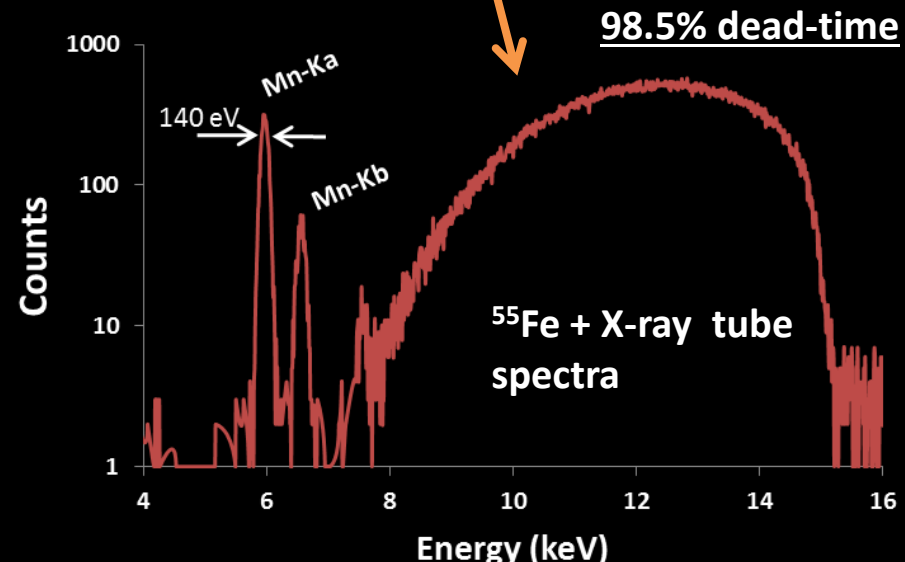
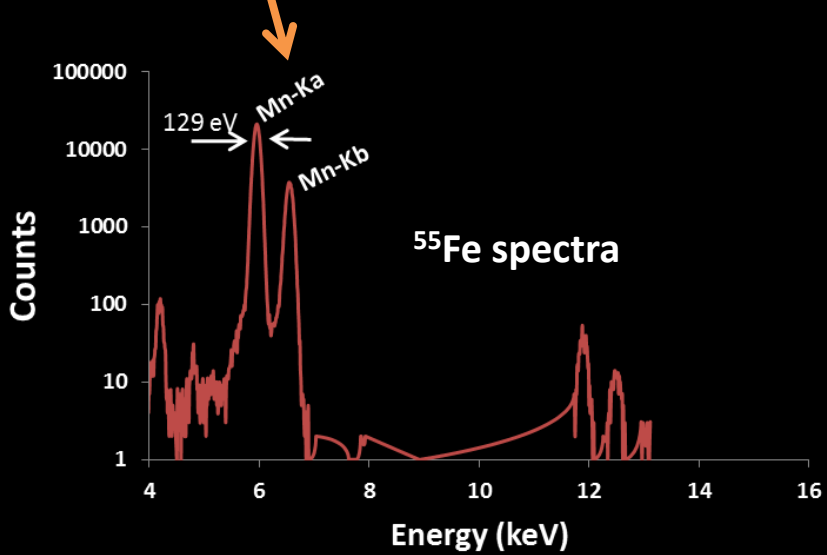
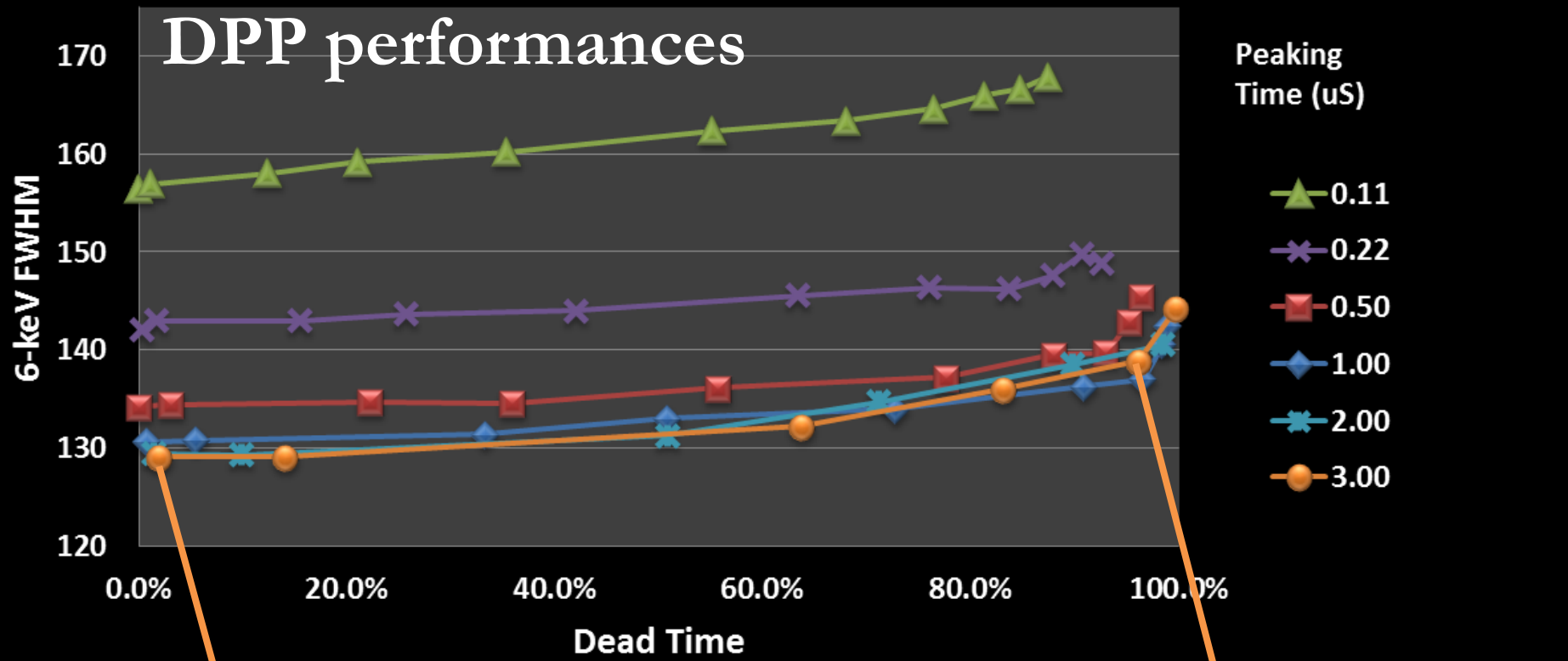


Detector SDD

- CUBE preamplifier
- Temp= -60°C
- Collim. Area = 50mm²
- Signal rise = 300ns
- Flattop = 330 ns

DPP performances





DPP

customization



10 cm

Supply: +/- 5V
Power: 1.5W

- Compact single-board design, low power
- Design to be reconfigurable and adaptive to several applications
- Scalable to multi channel system (in daisy chain mode)
- High performance 16-bit 125-MHz ADC. High performance FPGA
- Possibility to add list mode operation
- USB2.0 or Ethernet TCP/IP
- Simple DLL libraries, or LabView





VERDI-3



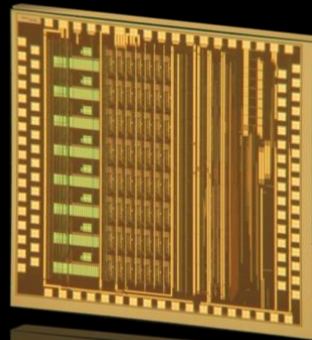
Silicon
Lithium
Detectors



Silicon detectors
(PIN, SDD, SSDD for gamma scintillator)



Germanium Detectors
(Segmented, Coaxial, Planar)



Multi-channel readout of different
detector for several applications



PMTs (or
SiPM)

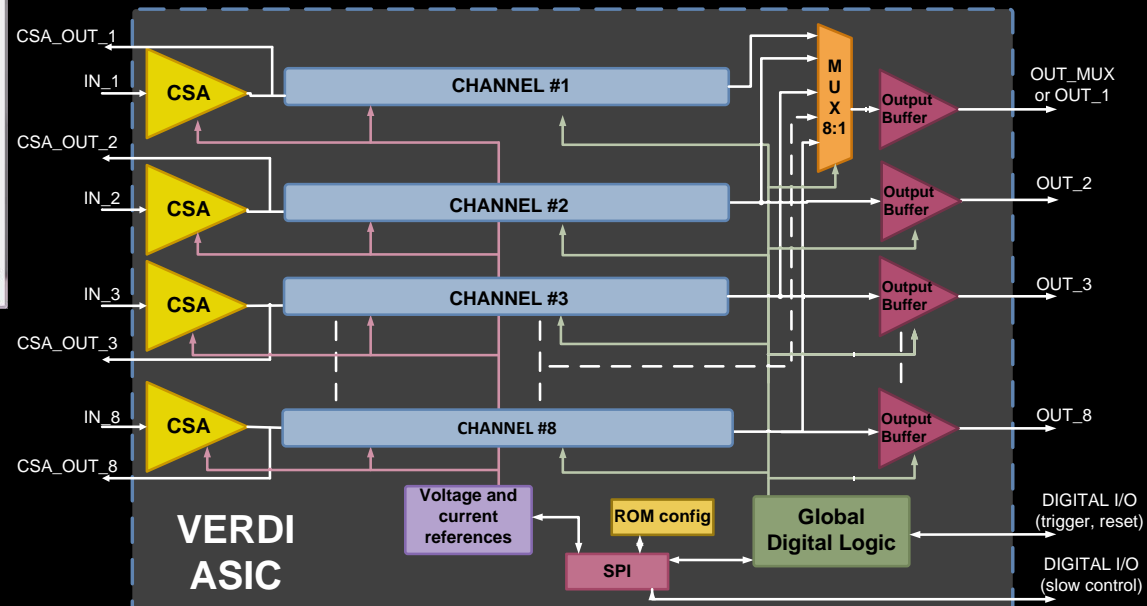
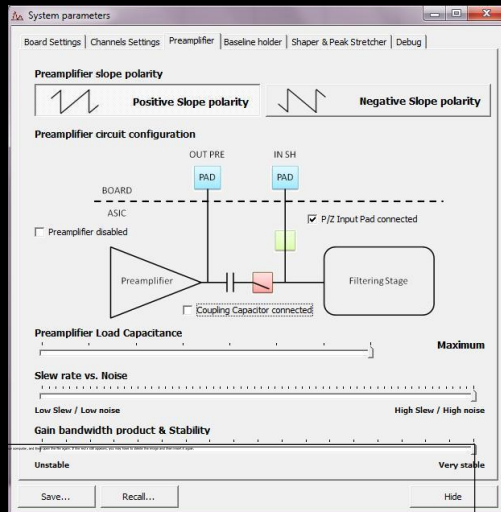
VERDI Module



8 complete analog channels

Single +5V power supply

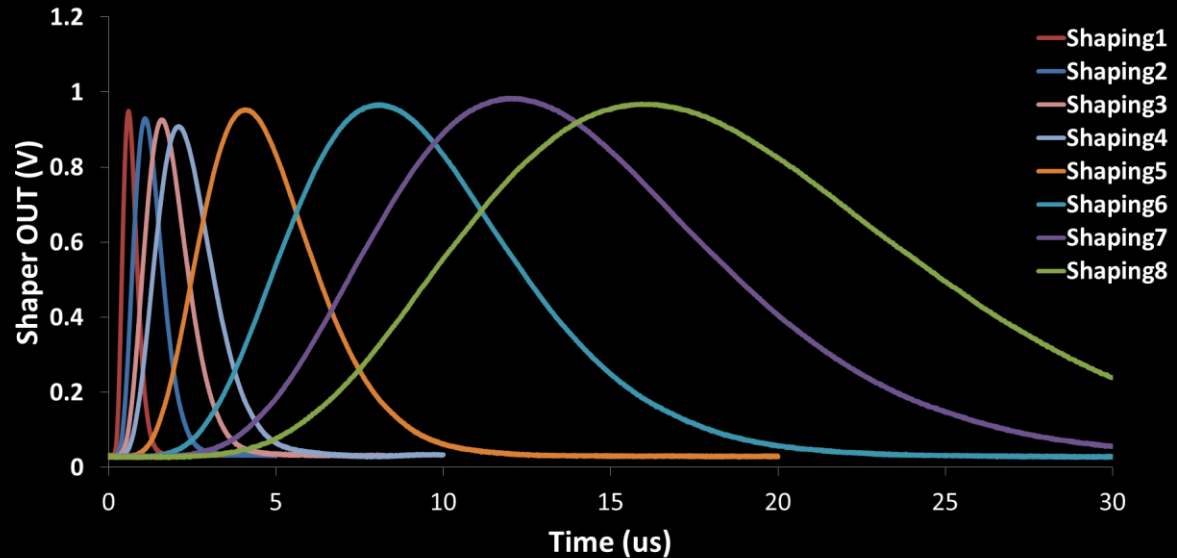
USB2 interface, driver and DLL



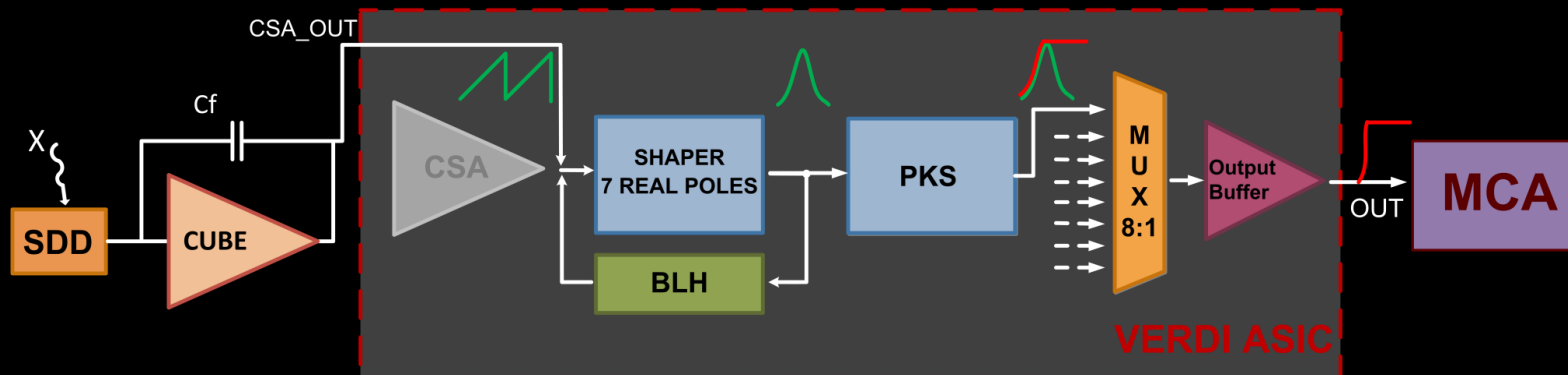
XRF application with SDDs

VERDI config.

- Pulsed-reset
- External preamp.
- Internal shaper, PKS.
- Energy range = 0 - 40 keV
- Output = Multiplexer



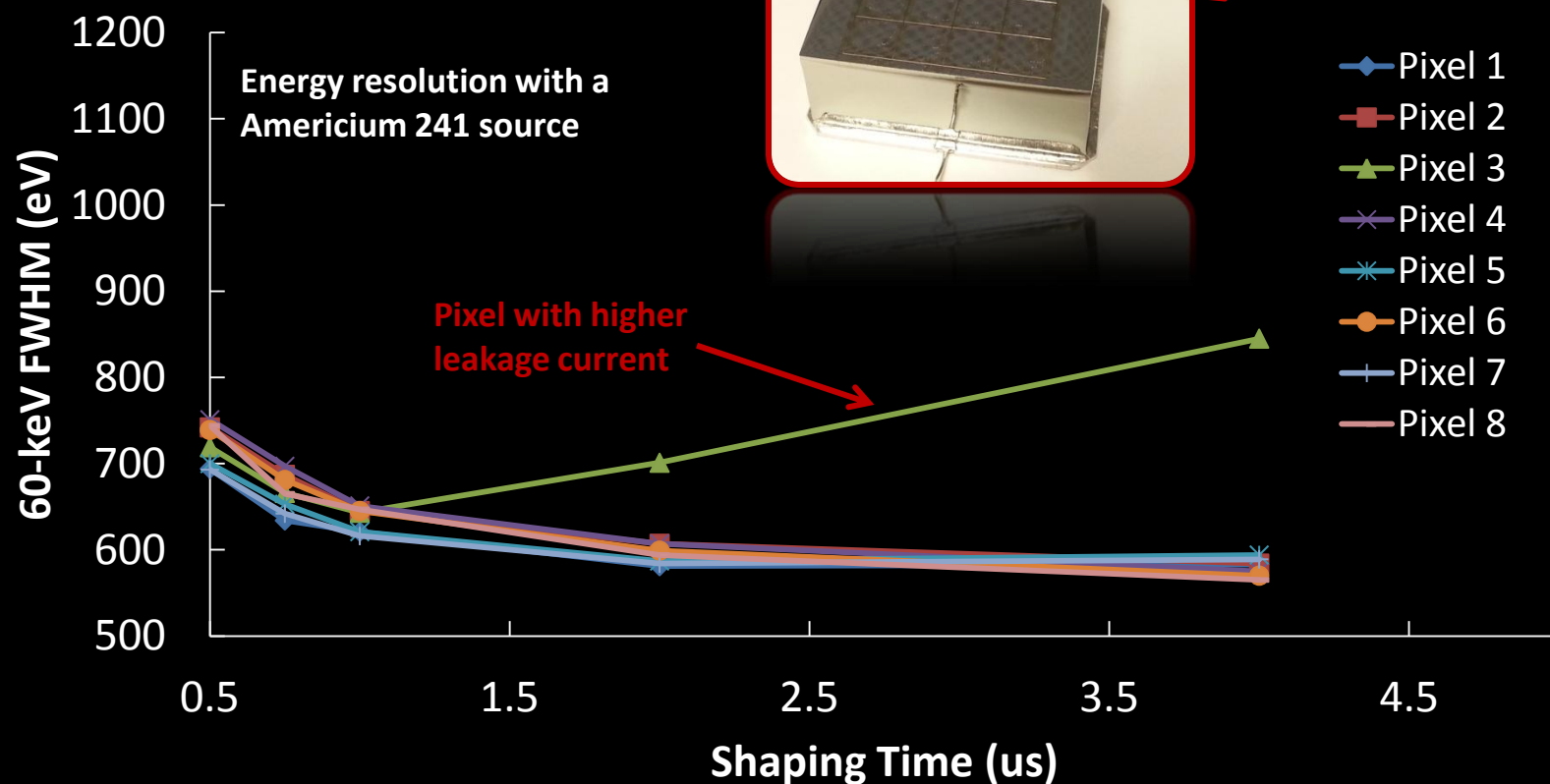
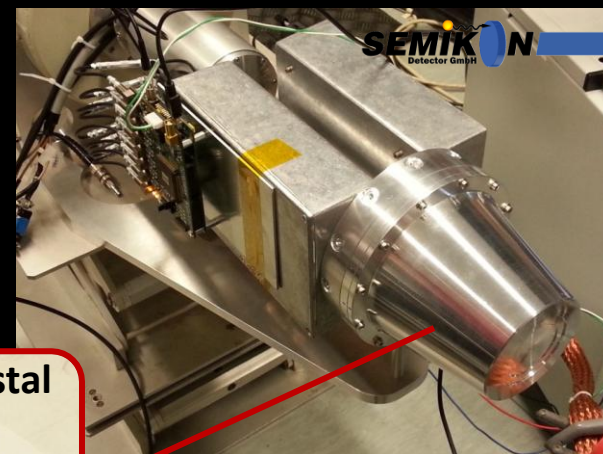
Fe55 Source
25mm² single-anode SDD
Temp. = -30°C



Detector main characteristic:

- Structured HPGe monolithic detector
- Thickness 11mm
- 16 pixel with 6mm pitch
- Pixel area 36mm²
- Operation close to LN₂ temperature

Experimental setup



Thank you

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X and Gamma Ray Electronics