

Problem: There is need for systems processing data from particle detectors such as scintillation counters, silicon pixel and strip detectors, or silicon photomultipliers (SiPMs).

Solution: We are developing data acquisition electronics performing the SiPM readout. The electronics can be used either standalone, or as parts of larger data acquisition systems.

Data Processing Electronics for Silicon Photomultipliers

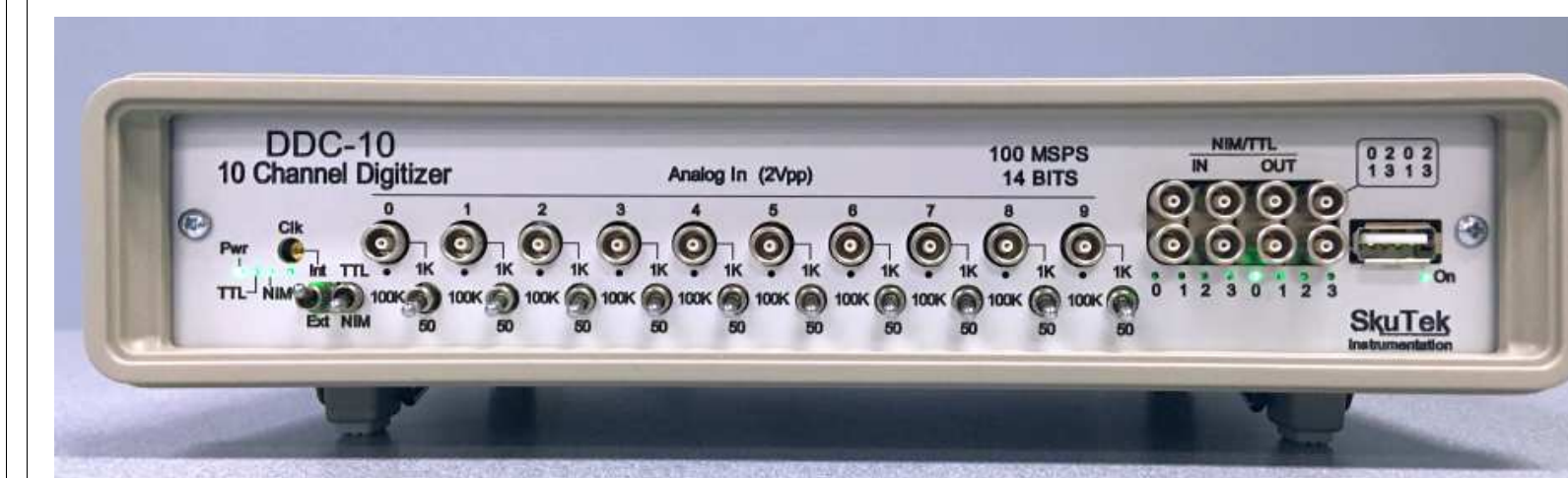
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SkuTek Instrumentation, www.skutek.com

DE-SC0013144

Ten Channel FemtoDAQ-10

- SiPM Bias Output +5 to +90 Volts
- Two Analog Reconstruction Channels
- Several NIM / TTL Logic GPIO
- Gigabit Ethernet and USB-2
- On-Board Linux with 0.5GB RAM
- Optional Video Output to HDMI Monitor



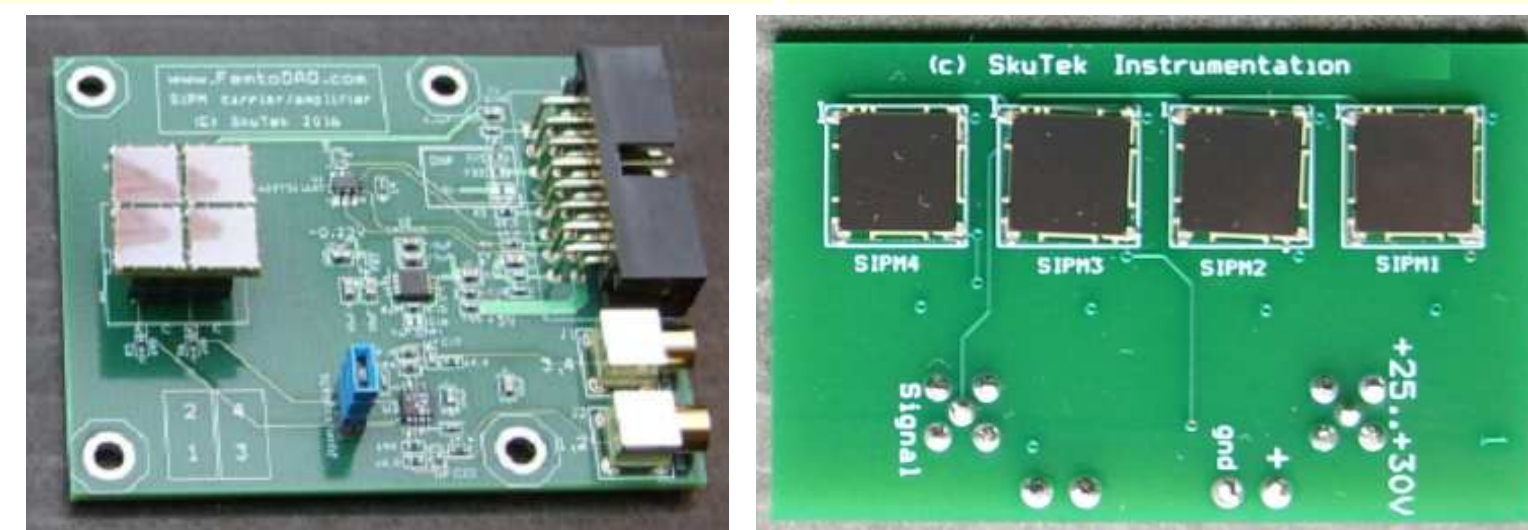
Standalone, Hand Held FemtoDAQ



Details: <http://www.FemtoDAQ.com>

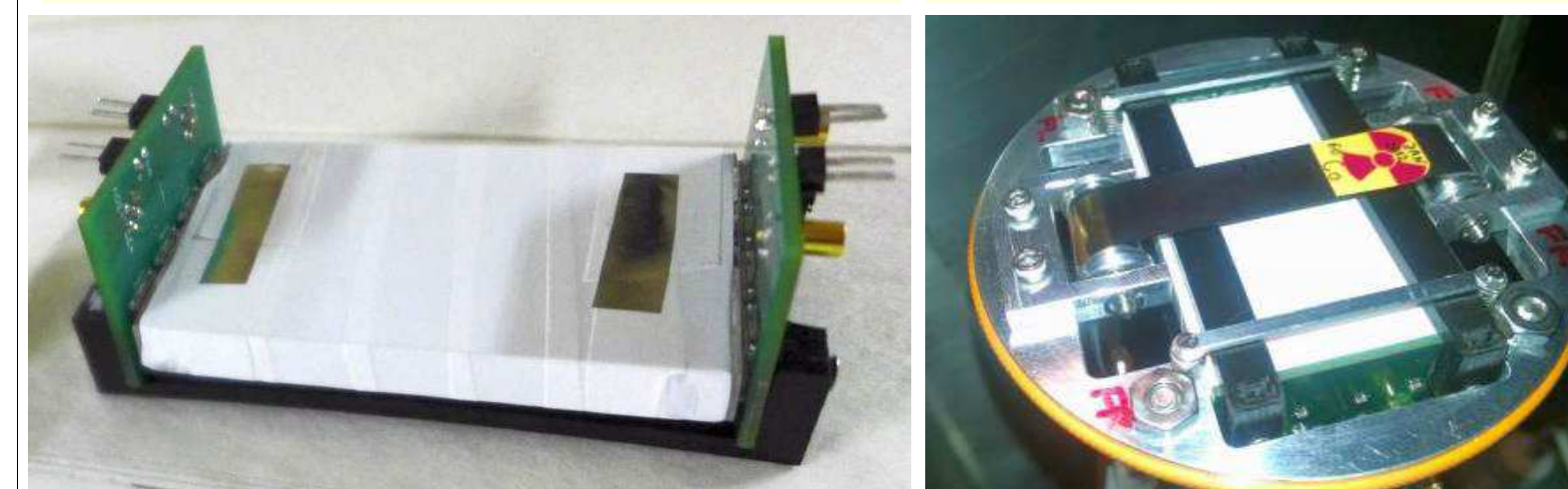
SiPM Carrier Boards were used @ MSU-NSCL

SiPM Carrier Board with amplification SiPM Carrier Board w/o amplification



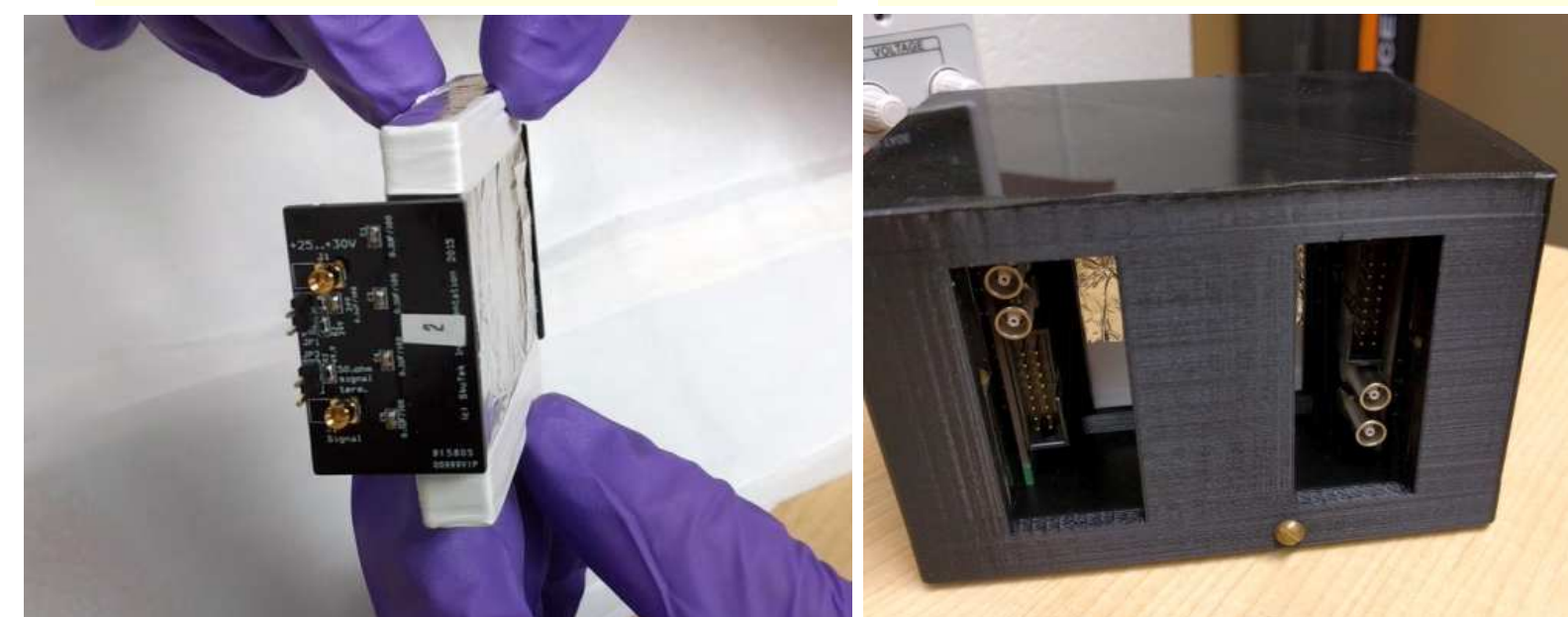
SiPM Carrier Boards with scintillators

At ORNL the SiPM boards were used as a beta particle trigger for the VANDLE neutron array.
At NSCL the boards measured light ions in nuclear fragmentation.



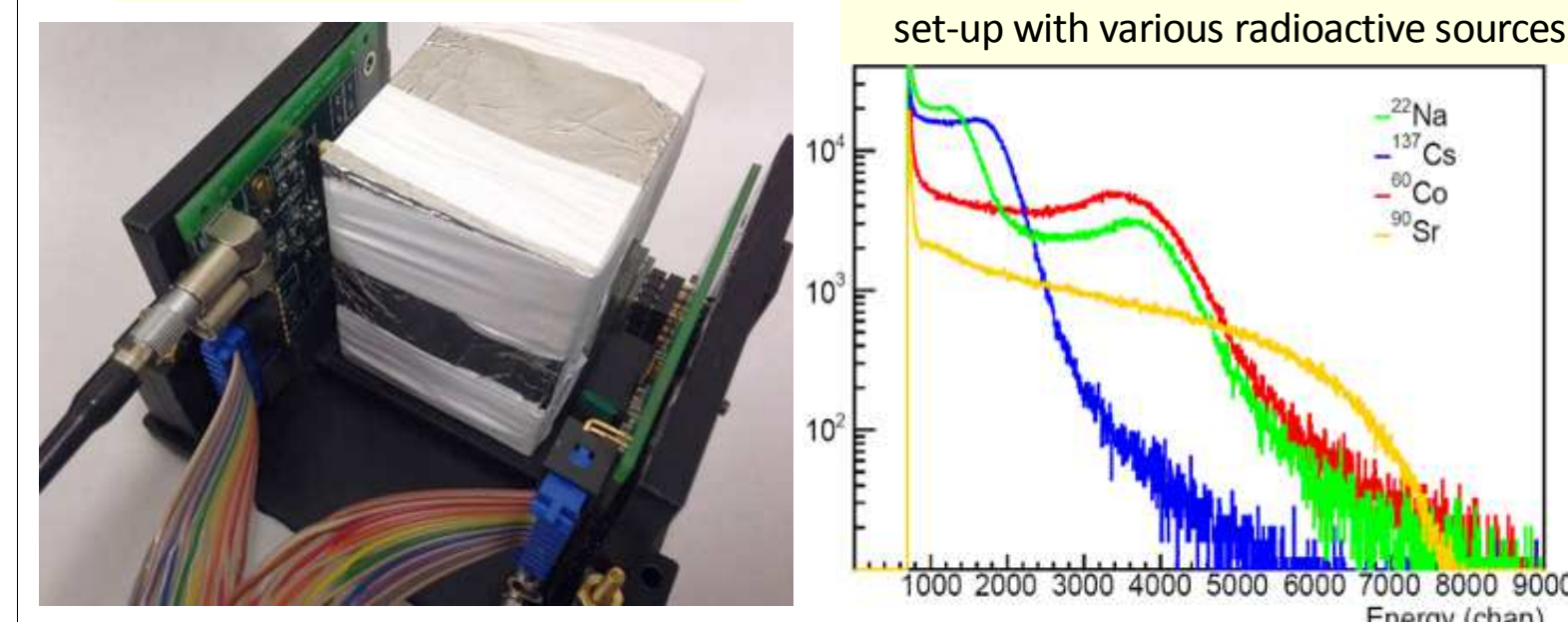
SiPM Carrier Boards at MSU-NSCL

SiPM board w/o amplification SiPM boards with amplification

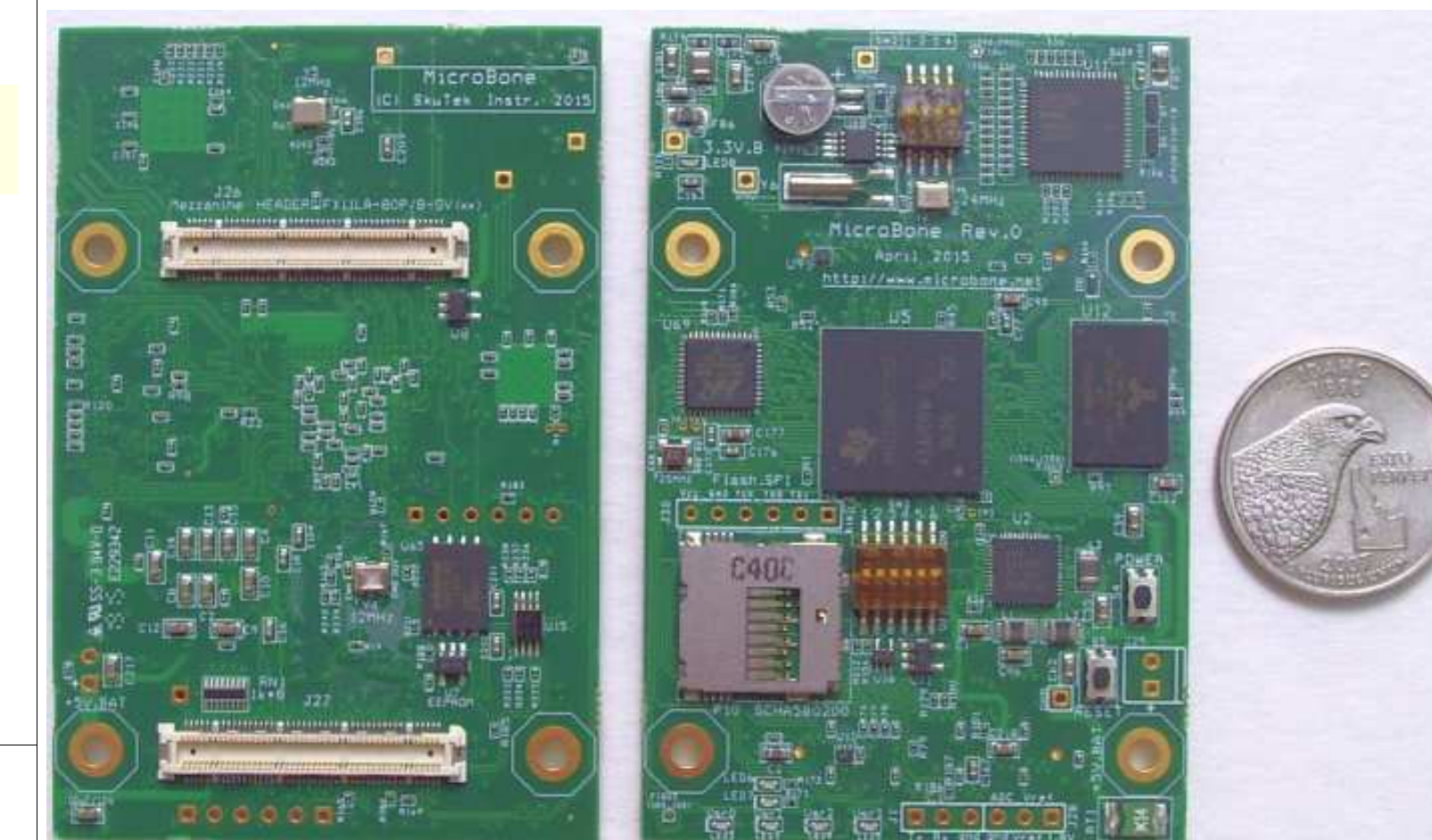


Results Obtained at MSU-NSCL

SiPM boards with amplification Energy spectra obtained @ MSU from the set-up with various radioactive sources.



MicroBone Single Board Computer Inside



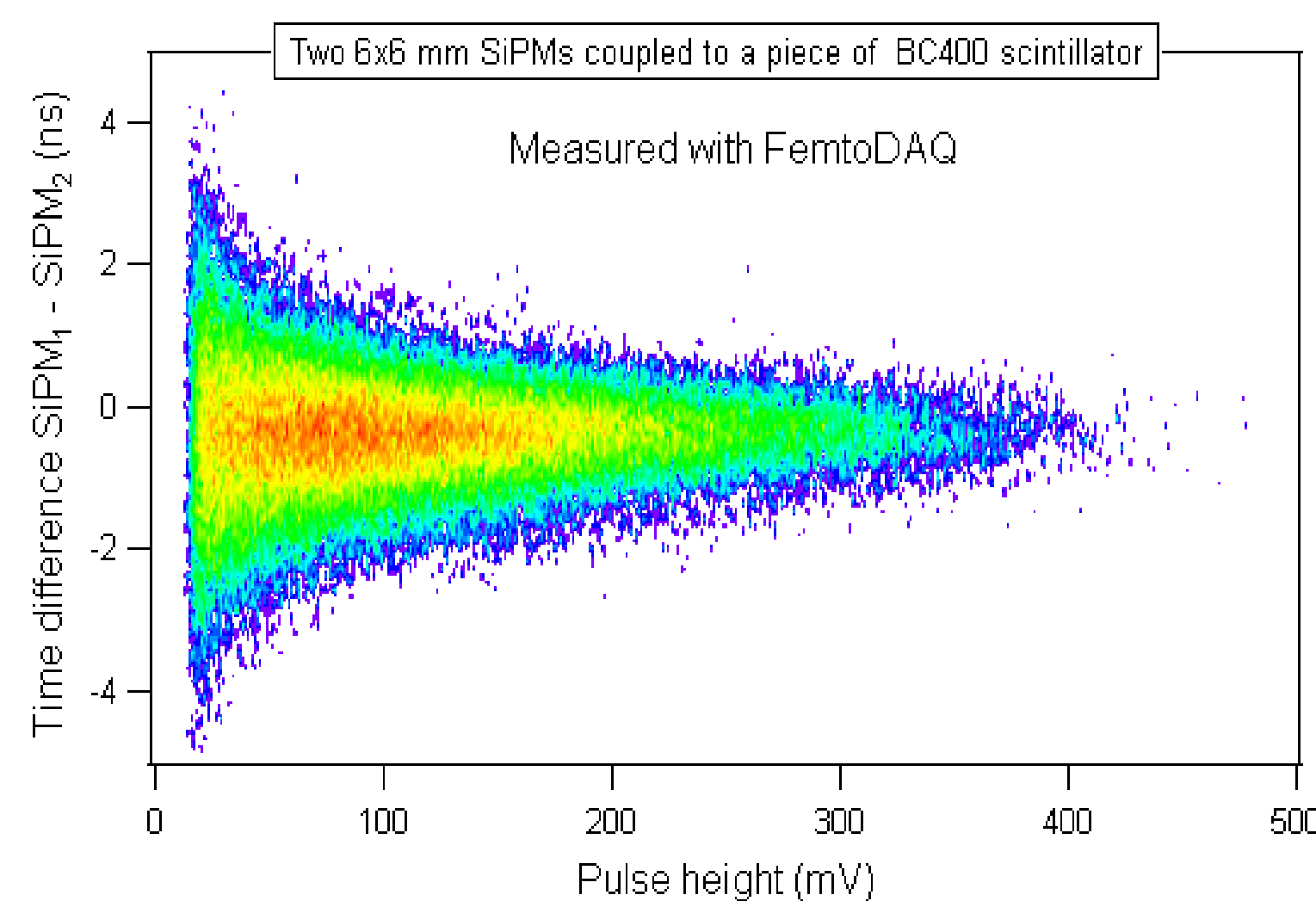
1 GHz ARM, Gigabit Ethernet, USB-2, 0.5GB RAM
Details: <http://www.skutek.com>

Inside FemtoDAQ

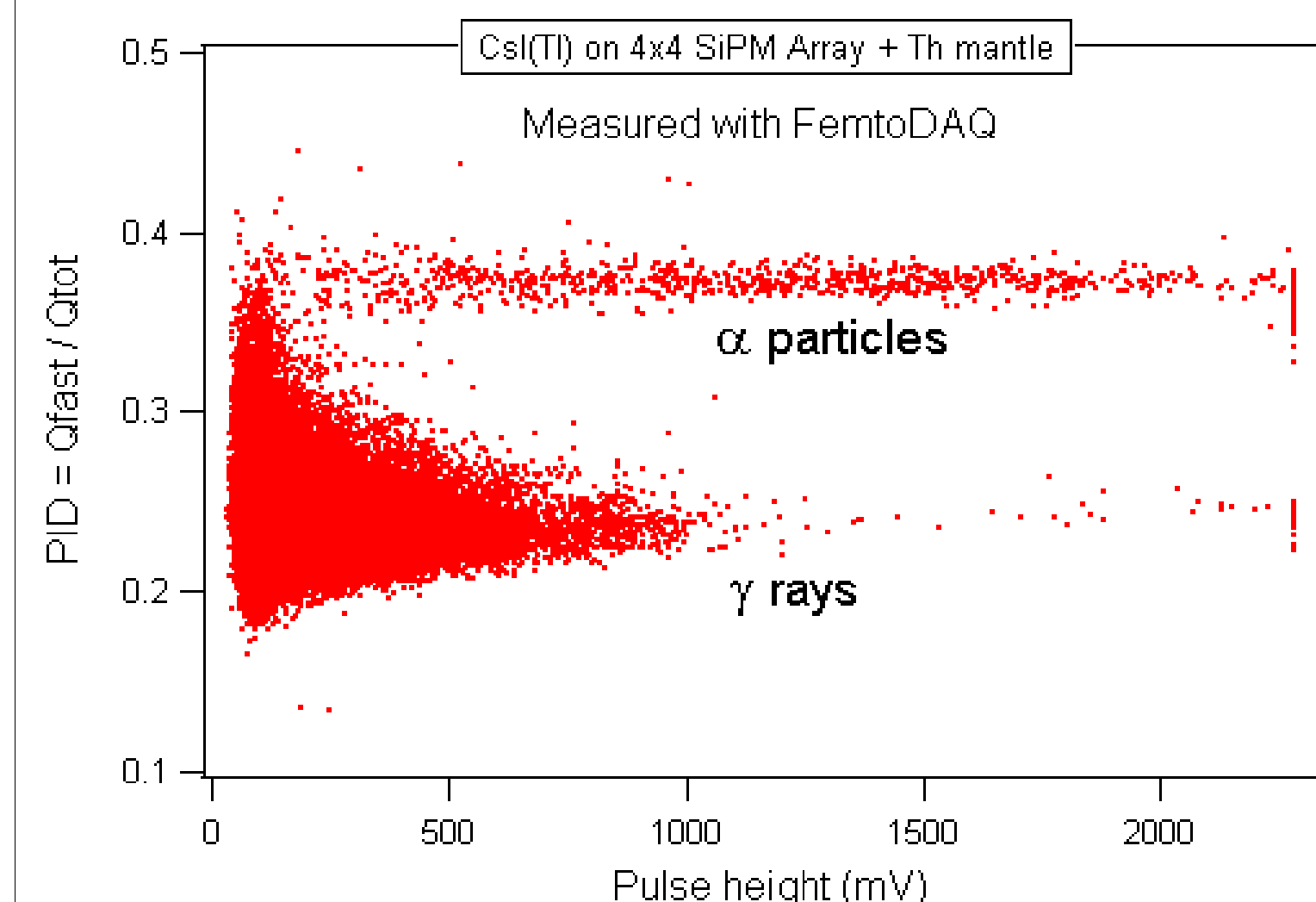
Commercial BeagleBone Black Bias Generator, 10V up to 90V 2-channel Digitizer: 14 bits, 100 MHz



In-House SiPM Results with FemtoDAQ



In-House SiPM Results with FemtoDAQ



FemtoDAQ Geography in North America



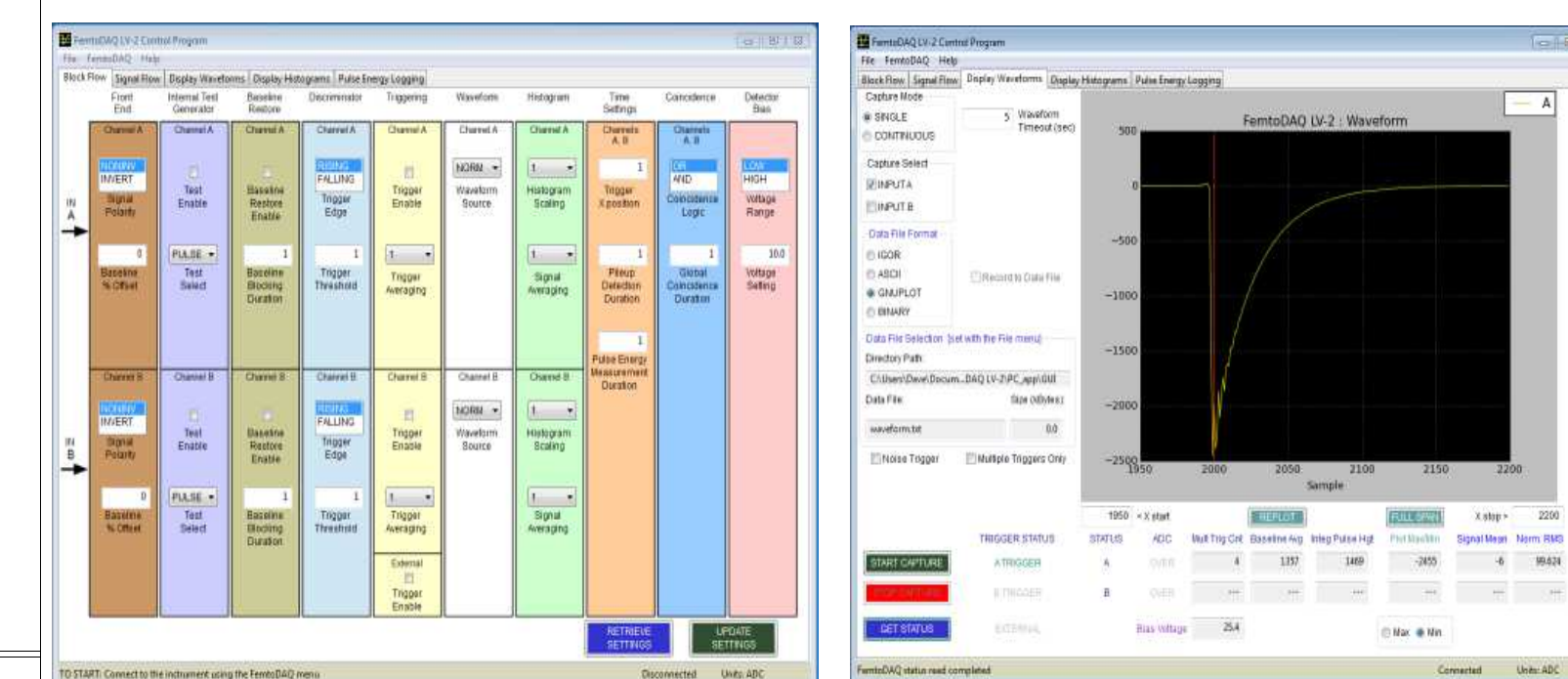
International Sales: Germany and Israel

Acknowledgements

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- Andreas Ruben (Wiener USA). Shloka Chandavar (MSU-NSCL)
- Our interns: Mandy Nevins, Jeffrey Sylor, Dinesh Anand Bashkaran, Brian Kroetz
- DOE NP Program Managers: Michelle Shinn and Manouchehr Farkhondeh

User Friendly Operation

Simulated NIM bin with modules Waveform and histogram display



Instruments Are Ready For The Cloud

The MicroBone Single Board Computer can push data from our devices to the cloud, where the data can be stored and analyzed. Information from several distributed units can be correlated with other data, like e.g. solar, atmospheric, or seismic activities (to provide a few example ideas).