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.

Standalone, Hand Held FemtoDAQ

Details: [http://www.FemtoDAQ.com](http://www.FemtoDAQ.com)

Inside FemtoDAQ

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

FemtoDAQ Geography in North America

International Sales: Germany and Israel

Data Processing Electronics for Silicon Photomultipliers

Wojtek Skulski, David Miller, Vedant Karia, James Vitkus
SkuTek Instrumentation, www.skutek.com
DE-SC0013144

SiPM Carrier Boards were used @ MSU-NSCL

SiPM Carrier Board with amplification

SiPM Carrier Board w/o amplification

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.

In-House SiPM Results with FemtoDAQ

Two 6 mm SiPMs coupled to a piece of BGO scintillator

Measured with FemtoDAQ

Time differential SiPM - SiPM [ns]

Pulse height [mV]

In-House SiPM Results with FemtoDAQ

Gamma rays

Energy spectra obtained with FemtoDAQ

Measured with FemtoDAQ

FD half-life [ns]

Pulse height [mV]

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Our interns: Mandy Nevins, Jeffrey Sylor, Dinesh Anand Bashkaran, Brian Kroetz
DOE NP Program Managers: Michelle Shinn and Manouchehr Farkhondeh

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

MicroBone Single Board Computer Inside

1 GHz ARM, Gigabit Ethernet, USB-2, 0.5GB RAM

Details: [http://www.skutek.com](http://www.skutek.com)

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).