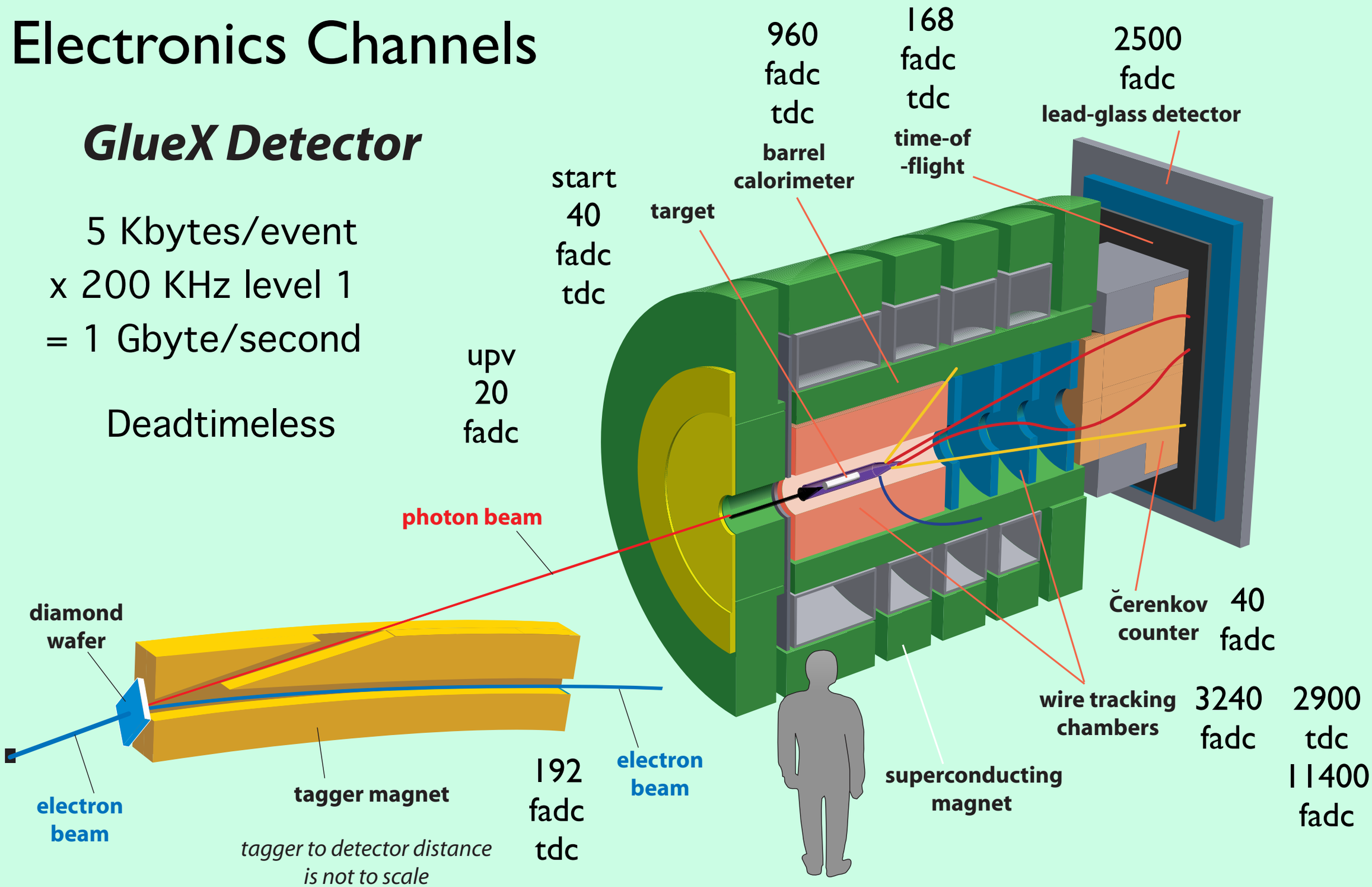
Electronics Channels

GlueX Detector

5 Kbytes/event
x 200 KHz level 1
= 1 Gbyte/second

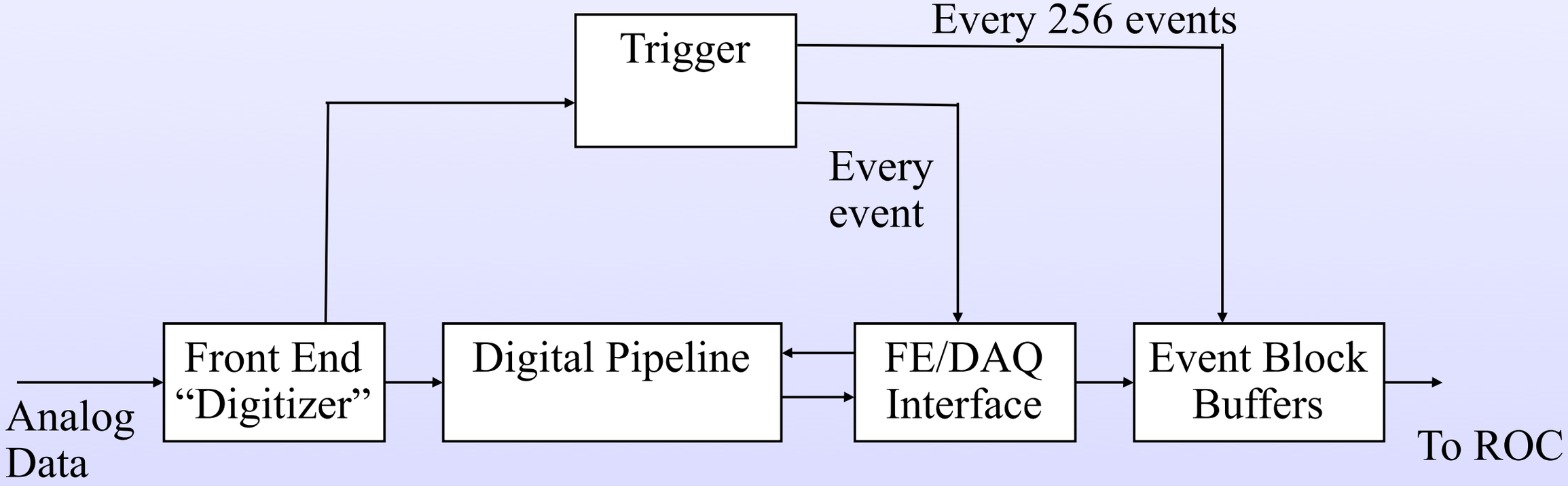
Deadtimeless



Paul Smith
Indiana University

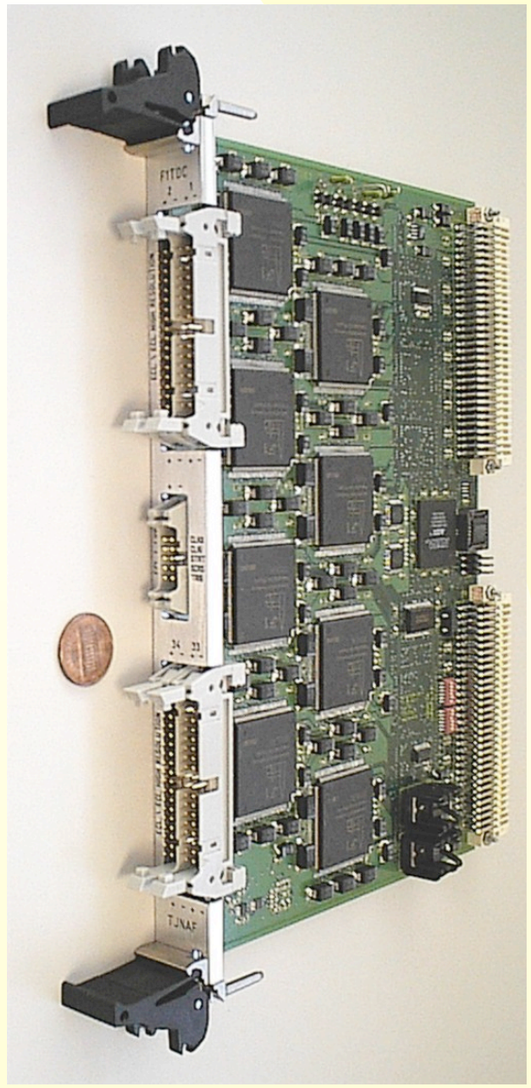
Level 1 Trigger and DAQ

- Front ends fully pipelined
- Trigger "spies" on data and is also pipelined
- Trigger causes "event extraction" from pipeline



U. S. Department of Energy's
Jefferson Lab
Thomas Jefferson National Accelerator Facility

F1TDC Specifications

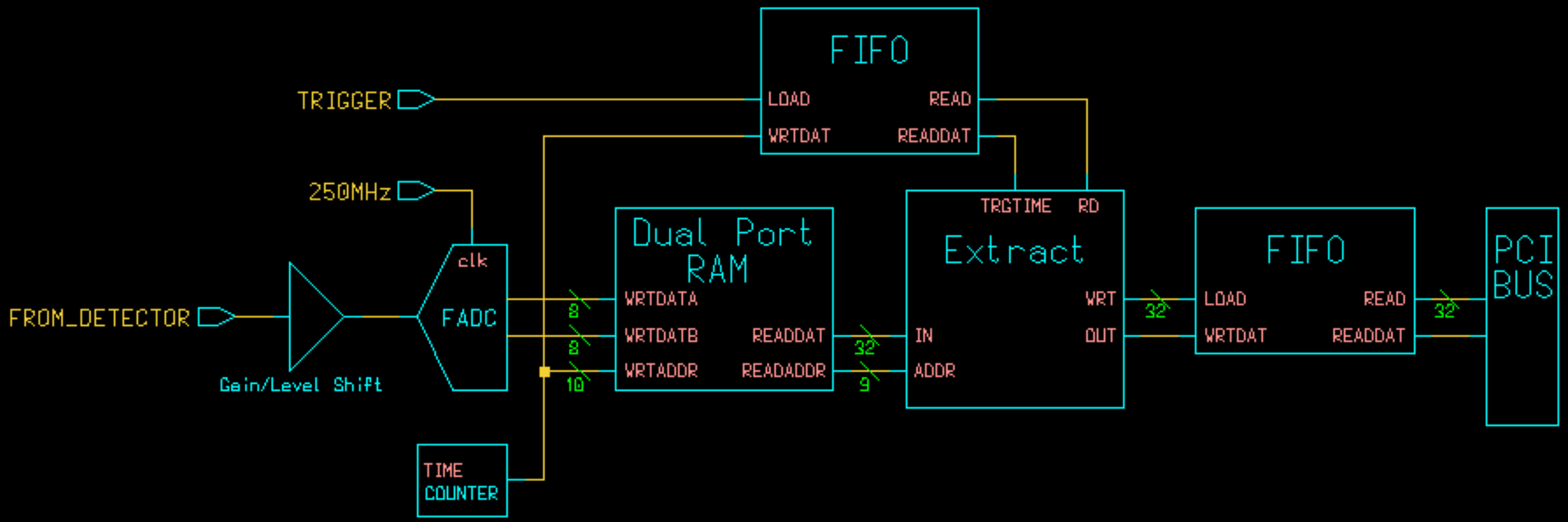


Packaging	6U VME64x
Inputs	Differential ECL (110 Ohm)
	64 Channels @ 120 pS LSB
	32 Channels @ 60 pS LSB
Control	START, SYNCRES, TRIGGER
	Front Panel – Differential ECL (110 Ohm)
	Backplane – Differential LVPECL (110 Ohm)
Clock	Differential LVPECL (110 Ohm) – 40 MHz
	Internal, Front Panel, Backplane
Dynamic Range	7.8 uS (for 120 pS LSB)
	3.9 uS (for 60 pS LSB)
Standard Deviation	Less than 0.9 LSB
INL	0 LSB
DNL	10-50% LSB
Acquisition	Trigger Matching w/ Zero suppression
	Programmable Trigger Window and Latency
FIFO	1 M TDC Data Words
Interface	32-bit VME Block Transfers (>20 Mbyte/s)
	64-bit VME Block Transfers (>40 Mbyte/s)
Power	+12V @ 0.5A
	-12V @ 0.4A
	+3.3V @ 7.3A
	+5V @ 1.8A

3 types of FADCs?

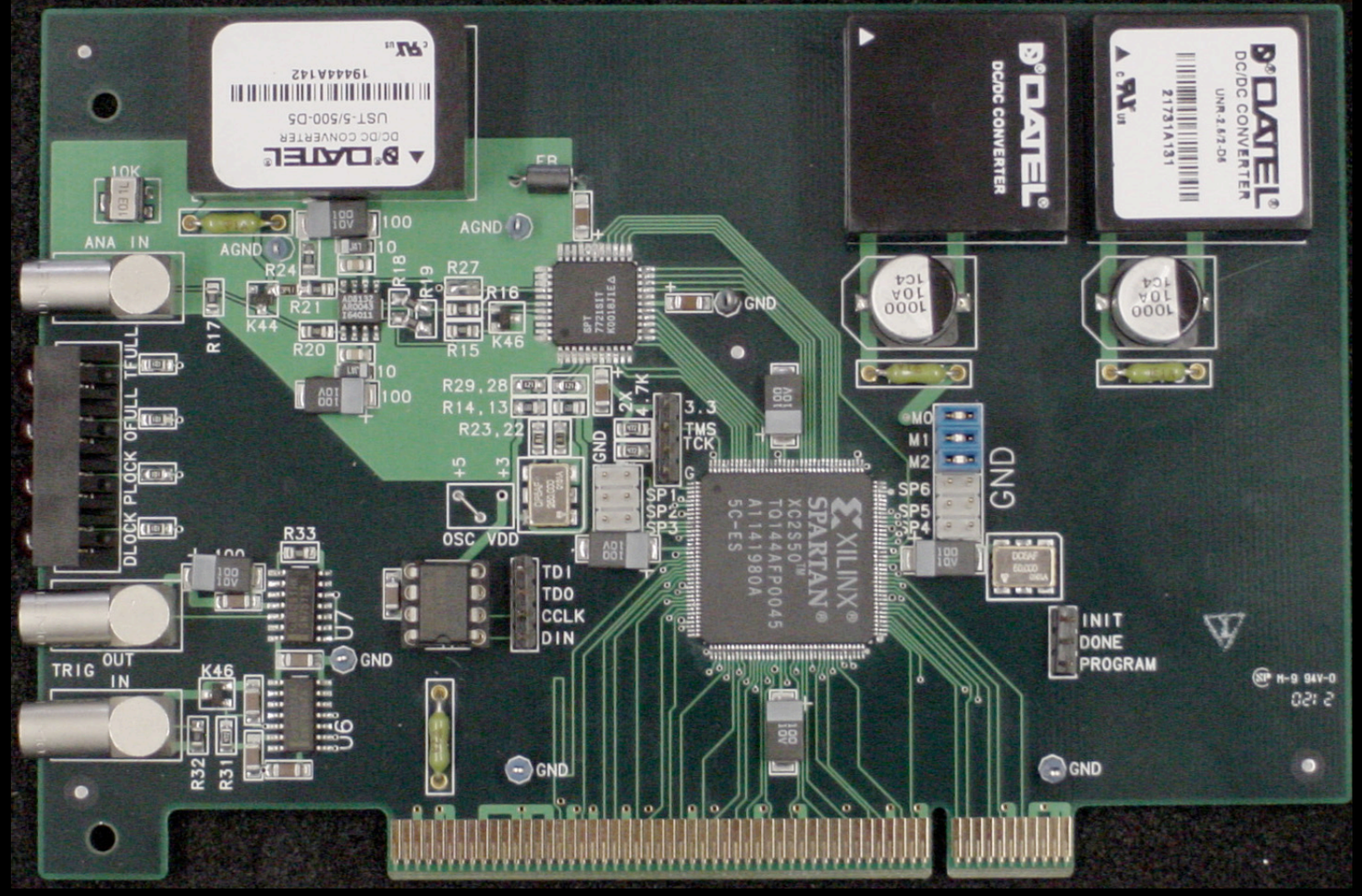
8 bits, 250 MSPS	10-12 bits, 125 MSPS	8-12 bits, 62.5 MSPS
4000 channels	3240 channels	11,400 channels
Calorimeters -energy sum	Central Tracking	Forward Drift Cathodes
Other PMT/SiPMT	dE/dX	
low density		high density low cost

Single channel FADC prototype



Test bed for:

- SPT converter chip
- Xilinx chip and software
- Mentor PCB & FPGA software
- Intellectual Property (PCI core)
- Robotic assembly



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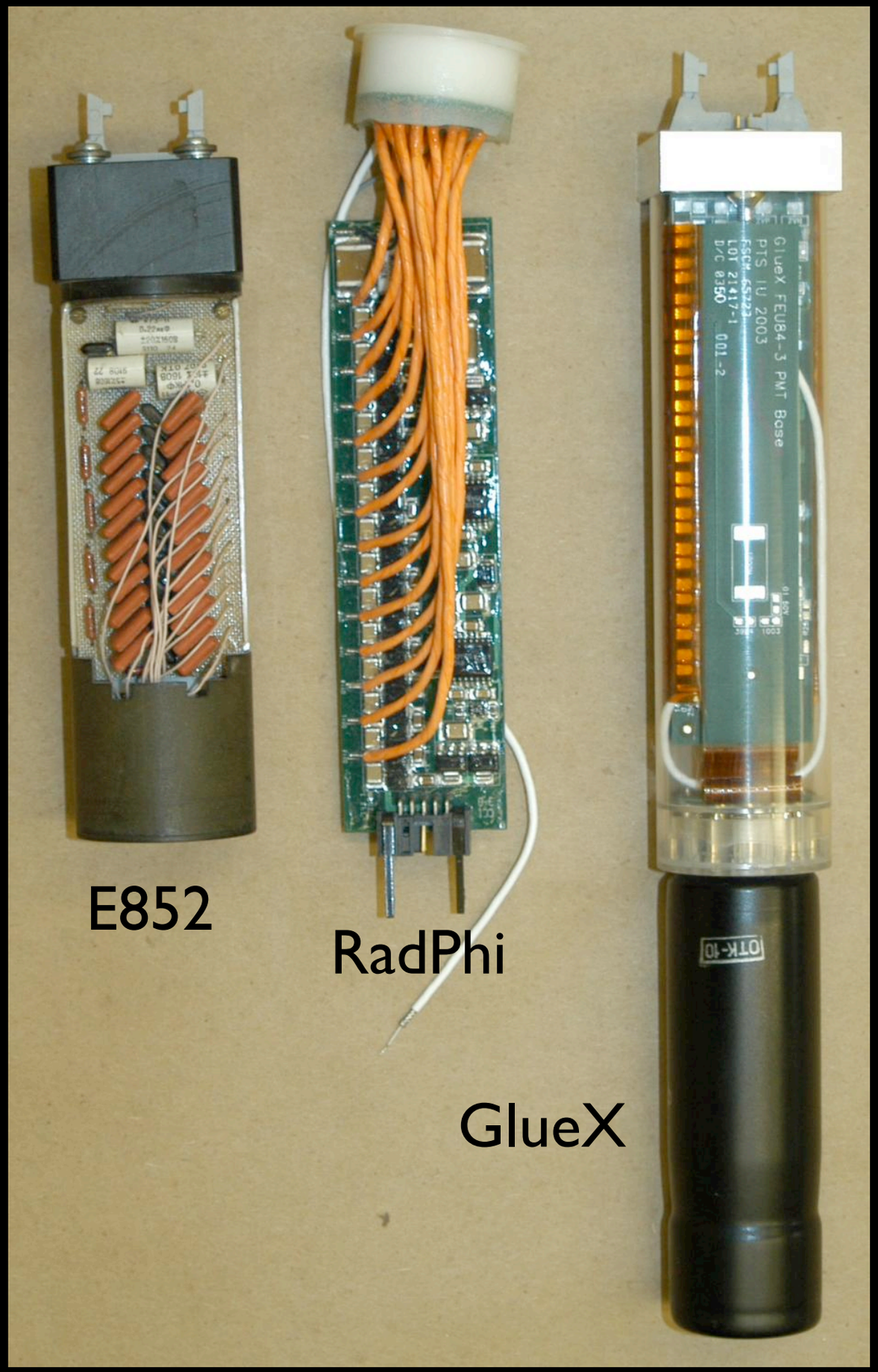
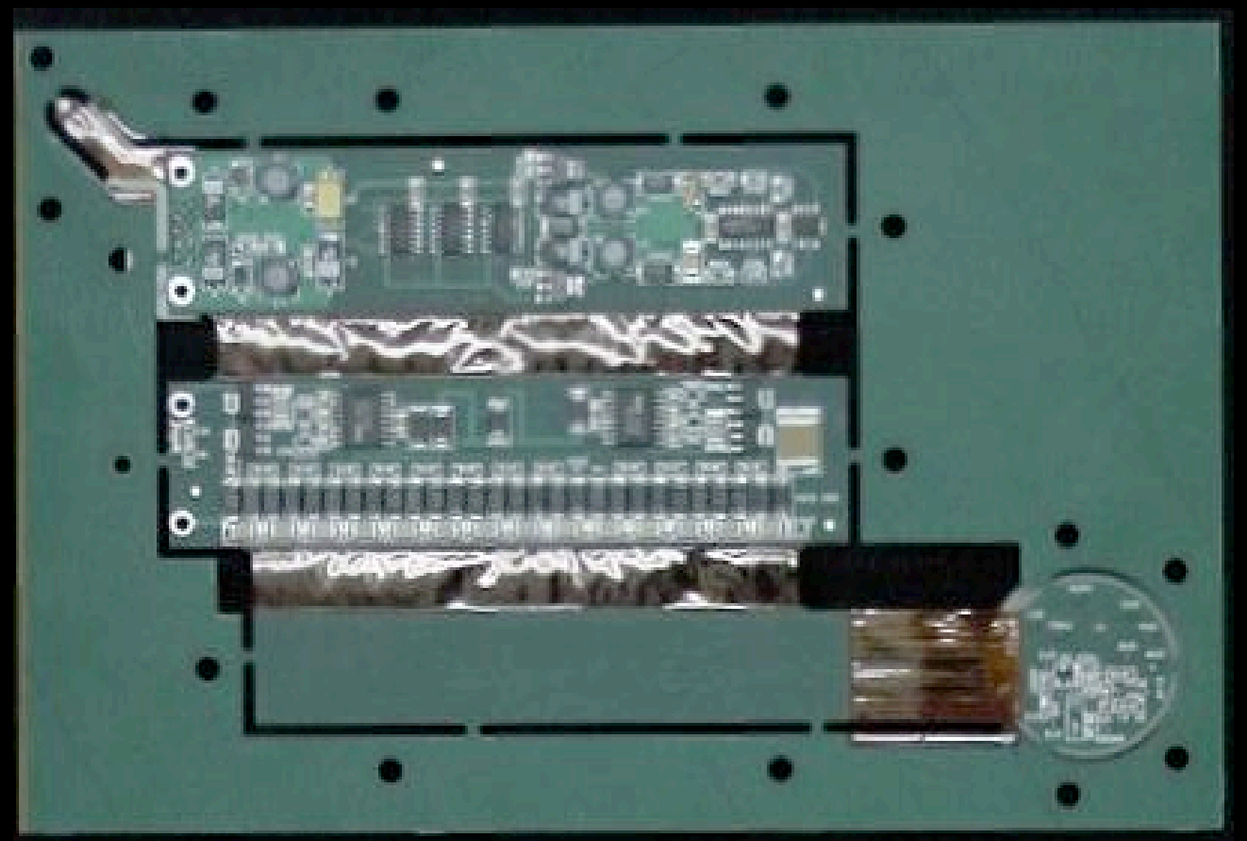
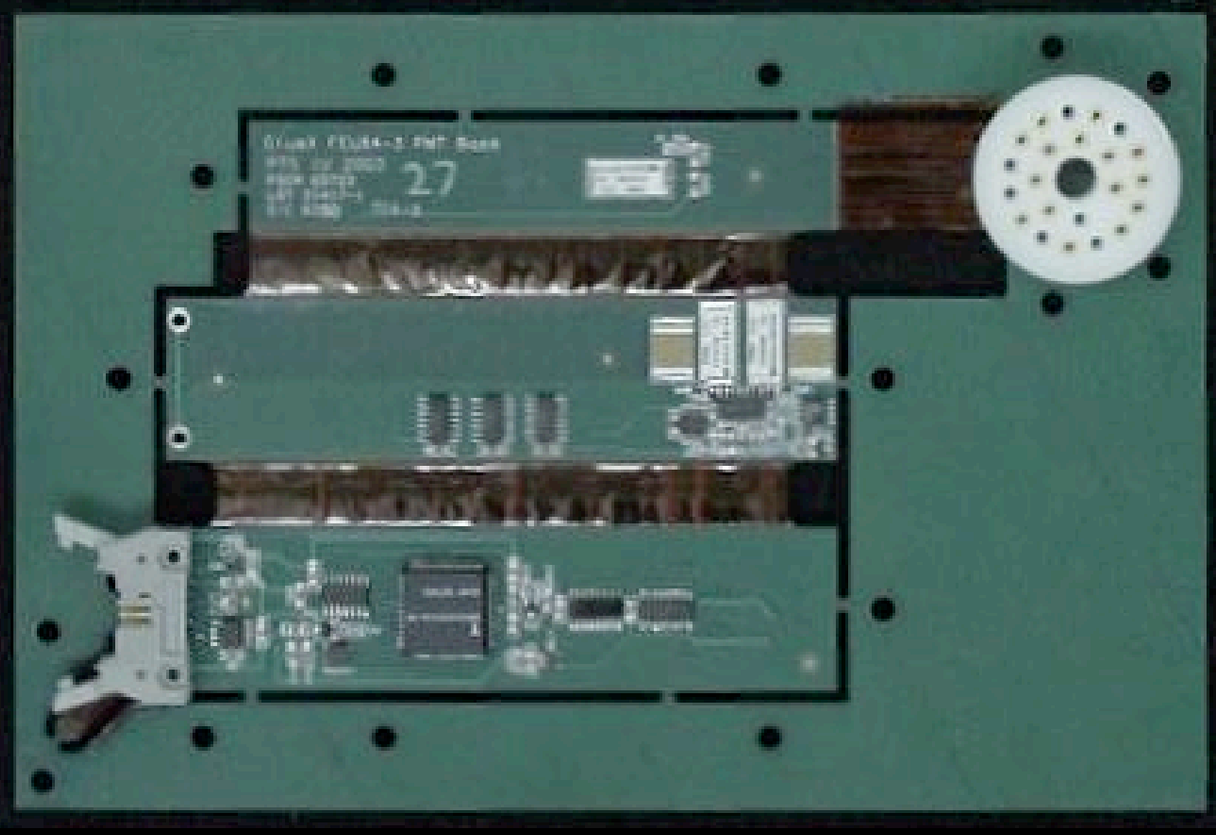
FCAL Cockcroft-Walton PMT base





100 Prototypes constructed at IU



GlueX Electronics Review - July 23 2003

Andy Lankford (UC Irvine), Glenn Young (ORNL), and John Domingo(JLab)

Selected Review Conclusions:

...characteristics are sound and appropriate choices for GlueX

✓ Although the GlueX electronics design parameters (e.g. data rates) exceed current JLab experiments, they do not exceed the performance of other contemporary experiments.

✓ More manpower will be needed in order to fully realize the GlueX electronics system. Considerable special (technical) expertise will also be required.

✓ The requirements and specifications of the analog front-end electronics are not yet adequately defined. This is coupled to the tentative status of some detector designs. The lack of full definition of detector designs may soon limit progress on electronics design...

! The decision to standardize all detector readout on a single TDC module design and a single Flash ADC module design is good, and will help simplify the overall electronics system design in a constructive way and conserve valuable engineering resources. The Committee feels that it is desirable to locate these modules in a radiation-free area if possible, in order to improve access.

Status

Detector:	FCAL	BCAL	CDC	FDC	TOF	CKOV	TAG	STC	UPV
On-detector Electronics:	CW PMT base	SiPM Disc	Preamp	Preamp Disc	Disc	Preamp	Disc	Disc	SiPM
Digitizer:	FADC	FADC	FADC	FADC	FADC	FADC	FADC	FADC	FADC
		TDC		TDC	TDC		TDC	TDC	
L1 Trigger:	Energy Sum	Track Count Energy Sum			Track Count			Track Count	

	"good" shape
	R&D in progress
	need further definition

Paul Smith
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