

GlueX Electronics Status

Collaboration Meeting
November 10, 2005

P. Smith

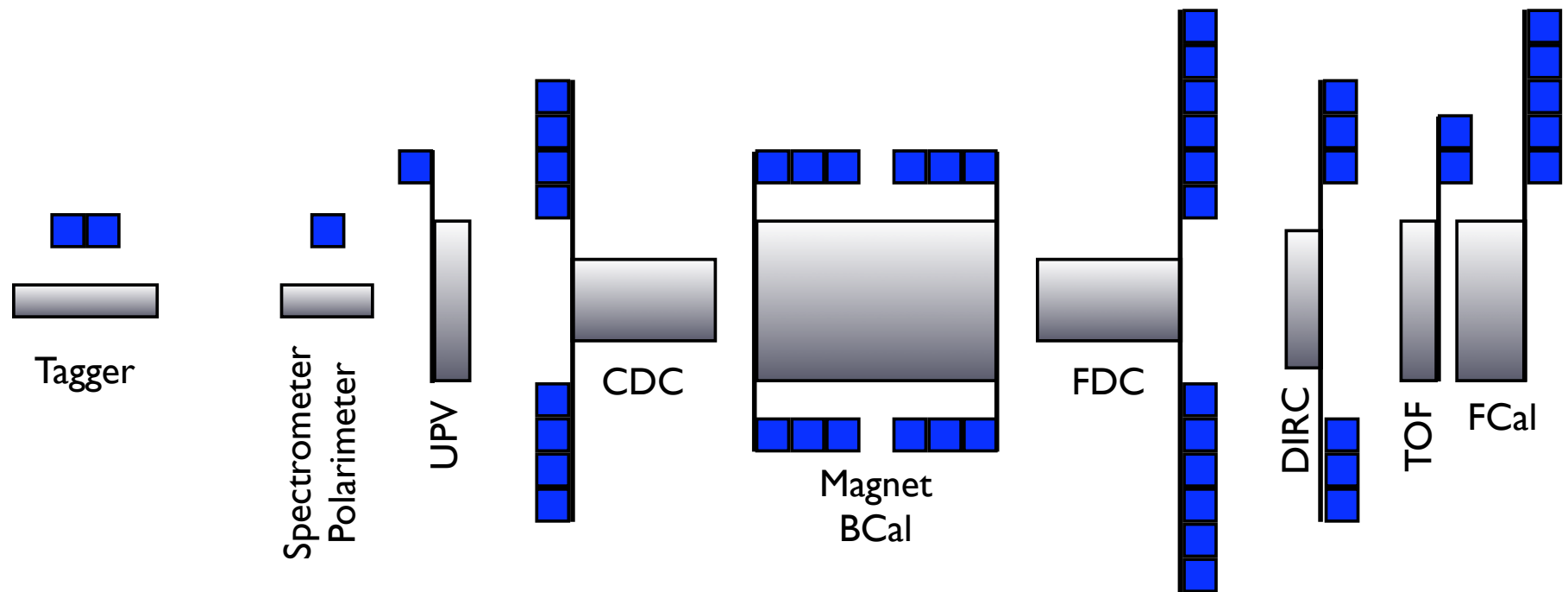
Since May:

- June 1: Drift Chamber Conference Call: GlueX-doc-519
- July 1: Meeting at IU: GlueX-doc-524
- September 9: Conference Call: GlueX-doc-531
- October 4: Tracking Workshop at Ohio U: GlueX-doc-534
- October 5: Preamp Conference Call: GlueX-doc-535
- November 9: Meeting at JLab

Summary of GlueX Detector Subsystems
 12 October 2005 P. Smith

Detector	Photon tagger	Pair spectrometer	Upstream Photon veto	Start counter	Central drift	Forward drifts	DIRC	Time-of-flight	Barrel calorimeter	Forward calorimeter
Type	Scintillator	Si microstrip	Scintillator	Scintillator	Straw tube	Planar chamber	Quartz	Scintillator	Sci fibers	Lead glass
Channel count	140 fixed 120 movable	2048	112	40	3240	2,856 anode 11,424 cathode	2000 TDC 32 FADC	168	2112	2500
Signal source	PMT fixed SiPMT movable	Silicon microstrip	PMT	PMT	Straw tube	anode wires cathode strips	Multi-anode PMT	PMT	SiPMT	PMT
Physics signal	100 pe	22000 e	100 pe	100 pe	338 e	94 e	25 pe	500 pe	250 pe/GeV	250 pe/GeV.
Energy resolution	0.1% (segmentation)	N/A	10%/√E	N/A	15%	15%	N/A.	N/A	2% + 5%/√E	3.6% + 7.3%/√E
Time resolution	100 ps	25 ns	1 ns	350 ps	2 ns	2 ns	200 ps	80 ps	150 + 50/√E ps	400 ps
Gain in detector	10 ⁶	1	10 ⁶	10 ⁶	2 x 10 ⁴	10 ⁵	10 ⁶	10 ⁶	8 x 10 ⁵	8 x 10 ⁵
Typical charge	16 pC	3.5 fC	16 pC	16 pC	1 pC	1.5 pC anodes 0.3 pC cathodes	4 pC	80 pC	32 pC/GeV	32 pC/GeV
Signal range	5	10	100	10	3 pC max 100 fC min	Anodes: 0.3 pC → 3 pC Cathodes: 10 fC → 1 pC	10	10	160 pC max 1.6 pC min 0.16 pC lsb	160 pC max 1.6 pC min 0.16 pC lsb
Preamp gain	no	10 ⁴	no	no	250	250	10	no	no	no
Maximum single channel rate	5 MHz	1 MHz	1 MHz	10 MHz	600 KHz	140 KHz	250 KHz	6 MHz	1.4 MHz	2 MHz
Discrimination	constant fraction	no	no	constant fraction	no	Maybe? (anode) no (cathode)	yes	constant fraction	yes	no
FADC	8 bits 250 Msps	12 bits 62.5 Msps	8 bits 250 Msps	8 bits 250 Msps	10 - 12 bits 125 Msps	Anodes?: Cathodes: 12 bits 62.5 Msps	8 bits 250 Msps	8 bits 250 Msps	8 bits 250 Msps 0.5 V fs	8 bits 250 Msps 0.5 V fs
TDC	62 ps	no	no	62 ps	no	Anodes?: 125 ps	125 ps	62 ps	62 ps	no
Level 1 trigger	yes (low rate runs)	no	no	track count	no	no	no	track count	energy sum	energy sum

Detector	Type	Channels	Modules	Crates	Racks
Photon Tagger	6U, 16 channel, 8 bit, 250 Msps FADC	260	17	1 DAQ	2
	6U, 32 channel, 62 ps TDC	260	9	1 DAQ	
	High voltage	150	13	1 HV	
	8 channel CFD	250	32	2 DISC	
Pair Polarimeter	6U, 64 channel, 10 bit, 62.5 Msps FADC	2048	32	2 DAQ	1
Upstream Photon Veto	6U, 16 channel, 8 bit, 250 Msps FADC	24	2	1 DAQ	1
	High voltage	24	2		
Start Counter	6U, 16 channel, 8 bit, 250 Msps FADC	40	3		
	6U, 32 channel, 62 ps TDC	40	2		
	High voltage	40	4		
	8 channel CFD	40	5	1 DISC	
Central Drift	6U, 16 channel, 125 Msps FADC	3240	203	13 DAQ	5
	High voltage	60	2		
	Gas				
Forward Drift anodes	6U, 16 channel, 125 Msps FADC	2900	182	12 DAQ	5
	High voltage	300	7	1 HV	
Forward Drift cathodes	6U, 64 channel, 10 bit, 62.5 Msps FADC	11,400	179	12 DAQ	4
	Gas				2
DIRC	8 channel CFD	2000	250	16 DISC	4
	6U, 16 channel, 8 bit, 250 Msps FADC	32	2		
	6U, 64 channel, 125 ps TDC	2000	32	2 DAQ	
	High voltage	32	3	1 HV	
Time of Flight	8 channel CFD	168	21	2 DISC	2
	6U, 32 channel, 62 ps TDC	168	6		
	6U, 16 channel, 8 bit, 250 Msps FADC	168	11	1 DAQ	
	High voltage	168	14	1 HV	
Barrel Calorimeter	6U, 16 channel, 8 bit, 250 Msps FADC with energy sum	2112	132	9 DAQ	11
	6U, 32 channel, 62 ps TDC	2112	66	5 DAQ	
	8 channel CFD	2112	264	17 DISC	
Forward Calorimeter	6U, 16 channel, 8 bit, 250 Msps FADC with energy sum	2500	157	10 DAQ	4
	Cockcroft Walton control, misc			1 DISC	1
Level 1 Trigger				3 DAQ	1
Totals				115	46



GlueX “exploded” with racks

Detector electronics R&D issues:

- Beamline: Pair Spectrometer, Polarimeter
- CDC: # of primary electrons, gain, shaping channel count for tests?
- FDC: # of primary electrons, gain, shaping dE/dX : cathodes, anodes, TDC, ADC channel count for tests?
- DIRC vs Gas Cerenkov
- BCAL: channel count, photodetectors Discs, TDCs
- Trigger: energy sums, “track” counts Level I algorithm

Money:

- Struck SIS3320 200 Msps VME FADC - 2? @ \$7k - anodes
- Struck SIS3300 100 Msps VME FADC - 3? @ \$5k - cathodes
- Preamps:
 - ▶ Design @ \$31k??
 - ▶ MOSIS prototype @ \$27k??? (40 chips)
 - ▶ Production @ \$120k???? (2400 chips)
- VME Test crates, CPUs 5? @ \$12k?
- JLab FI TDCs, fADCs
- IUCF fADCs