

Summary of GlueX Detector Subsystems

8 June 2006 P. Smith

Detector	Photon tagger	Pair polarimeter	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	Scintillator	Straw tube	Planar chamber	Quartz	Scintillator	Sci fibers	Lead glass
Channel count	144 fixed 120 movable	2048	32	112	40	3240	2,856 anode 11,424 cathode	2000 TDC 32 FADC	168	1920 inner 960 outer	2500
Signal source	fixed - PMT movable - SiPM	Silicon microstrip	PMT	PMT	PMT	Straw tube	anode wires cathode strips	Multi-anode PMT	PMT	SiPM	PMT
Physics signal	100 pe	22000 e	100 pe	100 pe	100 pe	338 e	94 e	8 pe	500 pe	250 pe/GeV	250 pe/GeV.
Energy resolution	0.1% (segmentation)	N/A	N/A	10%/√E	N/A	15%	15%	N/A.	N/A	2% + 5%/√E	3.6% + 7.3%/√E
Single channel time resolution	100 ps	10 ns	1 ns	1 ns	350 ps	2 ns	2 ns	200 ps	140 ps	150 + 50/√E ps	400 ps
Gain in detector	10 ⁶	1	10 ⁶	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	16 pC	1 pC	1.5 pC anodes 0.3 pC cathodes	1 pC	80 pC	32 pC/GeV	32 pC/GeV
Signal range	5	10	10	100	10	3 pC max 100 fC min	anodes: 300 fC → 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	no	2 mV/fC	anodes: 2 mV/fC cathodes: 10 mV/fC	40	no	no	no
Maximum single channel rate	5 MHz	1 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	no	constant fraction	no	no	yes	constant fraction	yes	no
Scaler	yes	no	no	no	yes	no	no	no	no	no	no
FADC	8 bits 250 Msps	buffered latch	8 bits 250 Msps	8 bits 250 Msps	8 bits 250 Msps	12 bits 100 Msps 1 V (diff) fs	12 bits 100 Msps 1 V (diff) fs	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	special low rate runs only	no	no	62 ps	no	no	125 ps	62 ps	62 ps	no
Level 1 trigger	yes (low rate runs)	no	special low rate runs	no	track count	no	no	no	track count	energy sum	energy sum