

Design, Construction, & Performance of The GlueX Start Counter Detector

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Abstract

The GlueX experiment aims to study meson photoproduction while utilizing the coherent bremsstrahlung technique to produce a 9 GeV linearly polarized photon beam incident on a liquid H₂ target. A Start Counter detector was fabricated to properly identify the accelerator electron beam buckets and to provide accurate timing information. The Start Counter detector was designed to operate at photon intensities of up to 10⁸γ/s in the coherent peak and provides a timing resolution < 300 ps so as to provide successful identification of the electron beam buckets to within 99% accuracy. Furthermore, the Start Counter detector provides excellent solid angle coverage, ~ 90% of 4π hermeticity, and a high degree of segmentation for background rejection. It consists of a cylindrical array of 30 thin scintillators with pointed ends that bend towards the beam at the downstream end. Magnetic field insensitive silicon photomultiplier detectors were selected as the readout system.[1, 2]

Keywords: GlueX, Flash ADC, F1 TDC, Plastic Scintillator, Silicon Photomultiplier, Multi-Pixel Photon Counter, Time of Flight, Trigger, Particle Identification

References

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