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6.26 Development of an Ultra-Fast Photomultiplier Tube for the Next Generation Of Gamma-Ray Cherenkov Detectors for The National Ignition Facility

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A new ultra-fast photomultiplier tube with associated drivers has been developed for use in the next generation of Gamma-ray Cherenkov detectors for the National Ignition Facility (NIF). Pulse-dilation technology has been applied to a modified standard MCP based photomultiplier tube (PMT) to improve the temporal response time by about 10X. The new tube has been packaged suitably for deployment on the NIF and remote electronics designed to deliver the required non linear waveforms to the pulse dilation electrode. This is achieved with an avalanche pulse generator system capable of generating fast waveforms, arbitrarily over the useful parameter space. The pulse is delivered via impedance matching transformers and isolators, allowing the cathode to be ramped very quickly between two high voltages in a controlled non-linear manner. This results in near linear pulse dilation over several ns. The device has a built in fiducial system that allows easy calibration and testing with FO laser sources. Results will be presented demonstrating the greatly improved response time and other parameters of the device.

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