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14.42 Characterization of photodetector temporal response for neutron time-of-flight (nToF) diagnostics at the National Ignition Facility

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The temporal response of photodetectors used in nToF diagnostics at the NIF have been characterized to improve uncertainty in, and understanding of, shot parameters obtained from nTOF data. A 1 Hz laser, neutral density glass filters, and electrical attenuators were used to gather statistically-significant samples of photodetector impulse response functions (IRF) in rapid succession. Individual components have been absolutely calibrated to minimize systematic uncertainties. The zeroth, first, and second central moments of the IRF were calculated (after timing the signal with respect to a monitor photodiode) as either the bias voltage or the amount of light incident on the detector was varied. The calculation of the moments is sensitive to data with a low signal/noise ratio and the data was therefore truncated to avoid non-physical results. The primary sources of uncertainty are jitter in the monitor photodiode and those associated with our characterization of the electrical attenuators and light filters; work is being done to reduce these. The change in the first and second moments was found to be well within acceptable limits. Work performed under auspices of U.S. Dept. of Energy by Lawrence Livermore National Laboratory, contract DE-AC52-07NA27344. IM Release: LLNL-ABS-744566

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