

Radiation Tolerant Electronic X-ray Cameras at The National Ignition Facility

Matthew DAYTON, Arthur CARPENTER, Dana HARGROVE, Perry BELL, Mark JACKSON,
Phillip DATTE, Hesham KHATER, Joe KIMBROUGH

Lawrence Livermore National Laboratory, USA

E-mail: dayton5@llnl.gov

The x-ray cameras inside the National Ignition Facility's (NIF) target chamber must endure a harsh radiation environment. This can be challenging since high-yield shots produce more than 10^{16} neutrons and gamma-rays in nanoseconds that can disrupt a camera's ability to capture and read out images. Film-based framing cameras have operated successfully in this environment; however, electronic-based cameras have not. We present two approaches that store the pixelated image temporarily as charge in either a capacitor or luminescent phosphor and then read out after the shot with a set of radiation tolerant electronics. Offline tests carried out with a flash x-ray machine and a 14 MeV neutron source were successful in predicting in-situ performance of the electronics in the NIF's radiation environment. Further work will lead to the replacement of film-based systems used inside the target chamber at the NIF.

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