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Development of a Novel Neutron Detector for 1-ps Time-Resolved Measurements of Neutron-Production History and Spectrum at Short-Pulse Lasers, OMEGA and the NIF JOHAN FRENJE, MARIA GATU JOHNSON, Massachusetts Institute of Technology, YASUNOBU ARIKAWA, Osaka University, CHRISTIAN STOECKL, Laboratory for Laser Energetics, University of Rochester, ARIKAWA PROJECT COLLABORATION, ARIKAWA PROJECT COLLABORATION, ARIKAWA PROJECT COLLABORATION — A novel neutron detector is being implemented for 1-ps time-resolved measurement of the neutron-production history and spectrum at the MTW and LFEX short-pulse lasers, and the OMEGA and NIF long-pulse lasers. This new diagnostic is based on the Pockels-effect concept and will provide at least 10better time resolution than current diagnostics. In the context of short-pulse-laser experiments, this diagnostic will provide a fundamental understanding of the production period and spectrum of the emitted neutrons, which is essential in the areas of life sciences, condensed-matter physics, fusion-material studies, and stellar nucleosynthesis of heavy elements. In the context of ICF, this diagnostic will provide critical experimental information about the dynamics of the hot-spot formation, fuel assembly and alpha heating in an ICF implosion, as encoded in the time evolution of neutron yield and hot-spot ion temperature. This work was supported in part by the U.S. DOE, the MIT/NNSA CoE, and LLE.

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