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Development of Scintillator Detectors for Fast-Ignition Experiments and Down-Scattered Neutron Measurements on OMEGA V.YU. GLEBOV, C. STOECKL, W. THEOBALD, T.C. SANGSTER, K.L. MARSHALL, M.J. SHOUP III, T. BUCZEK, A. PRUYNE, M. FOX, T. DUFFY, Laboratory for Laser Energetics, U. of Rochester, M.J. MORAN, LLNL, R. LAUCK, PTB, Germany — A small signal must be recorded after very large DT or hard x-ray signals in a neutron time-of-flight detector to measure down-scattered neutrons in cryogenic DT implosions or to measure neutron yield in the presence of hard x-ray background from an ultrahigh-intensity laser. Several detectors with plastic and liquid scintillators were developed and tested at the Omega/Omega EP Laser Facility in cryogenic DT implosions and integrated fast-ignition experiments. A gated photomultiplier tube was used to eliminate large DT or hard x-ray signals. The liquid scintillator consists of 0.4% PPO, 0.04% MSB dissolved in xylene and saturated with oxygen. The afterglow (long decay constant) with this scintillator is $\sim$100$\times$ less than conventional scintillators. This is an essential property to mitigate the residual scintillator signal in down-scattered neutron measurements and fast-ignition experiments. Detector designs and responses with the different scintillators will be presented. This work was supported by the U.S. Department of Energy Office of Inertial Confinement Fusion under Cooperative Agreement Nos. DE-FC52-08NA28302, DE-FC02-04ER54789, and DE-FG02-05ER54839.

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