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Picosecond Neutron Yields from Ultra-Intense Laser-Target Interactions C. LELAND ELLISON, University of Colorado, Boulder, JULIEN FUCHS, Laboratoire pour l'Utilisation des Lasers Intenses (LULI), Ecole Polytechnique — High-flux neutron sources for neutron imaging and materials analysis applications have typically been provided by accelerator-based (Spallation Neutron Source) and reactor-based (High Flux Isotope Reactor) neutron sources. A novel approach is to use ultra-intense ($> 10^{18}$ W/cm^2) laser-target interactions to generate picosecond, collimated neutrons. Here we examine the feasibility of a source based on current (LULI) and upcoming laser facility capabilities. A Monte-Carlo code calculates angular and energy distributions of neutrons generated by D-D fusion events occurring within a deuterated target for a given incident beam of D+ ions. The parameters of the deuteron beam are well understood from laser-plasma and laser-target studies relevant to fast-ignition fusion. Expected neutron yields are presented in comparison to conventional neutron sources, previous experimental neutron yields, and within the context of neutron shielding safety requirements.

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