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Neutron production from ultrashort pulse lasers in linear and circular polarization[1] GEORGE PETROV, JACK DAVIS, TZVETELINA PETROVA, Plasma Physics Division, Naval Research Laboratory 4555 Overlook Ave. SW, Washington DC 20375, USA, DREW HIGGINSON, FARHAT BEG, University of California-San Diego, La Jolla, California 92093, USA — Neutron production driven by ultrashort pulse lasers using linear and circular polarization has been investigated. Three representative reactions, $d-d$, $d{-}Li$ and$p{-}Li$ have been selected, for which the neutron yield has been calculated and compared. The properties of the proton and deuteron beams (conversion efficiency, maximum energy and energy distribution) have been analyzed and the neutron yield calculated as a function of foil thickness. The advantages and disadvantages of using protons and deuterons have been analyzed. A direct comparison of the neutron yield for linear and circular polarization revealed that the laser polarization strongly affects the neutron production. Liner polarization is more favorable for neutron production, but for ultrathin foils (20 nm) in the Radiation Pressure Acceleration regime circular polarization yields results that are comparable to that in linear polarization.

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