

D-D NUCLEAR FUSION PROCESSES INDUCED IN POLYEHTYLENE BY TW LASER-GENERATED PLASMA

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Abstract

Deuterium-Deuterium fusion processes were generated by focusing the 3 TW PALS Laser on solid deuterated polyethylene placed in vacuum. A deuterium ion acceleration of the order of 4 MeV was obtained using a laser irradiance $I_{\xi}^2 \sim 5 \times 10^{16}$ (W/cm² intensity)(μm^2 wavelength) on the target. The ion emission from plasma was monitored with Thomson parabola spectrometer, track detectors and ion collectors. Semiconductor detectors and plastic scintillators, employed in time-of-flight configuration, have permitted to detect *on-line* the characteristic 3.0 MeV protons and 2.45 MeV neutrons emission from the nuclear reaction.

From massive absorbent targets we have evaluated a neutron flux of about 5×10^7 neutrons per laser shot, indicating a reaction rate of the order of 10^8 fusion events per 300 ps laser pulse duration.