Investigation of fusion gain in fast ignition with conical targets

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(Received 18 October 2009 ; in final form 23 August 2010)

Abstract
Fast ignition is a new scheme for inertial confinement fusion (ICF). In this scheme, at first the interaction of ultraintense laser beam with the hohlraum wall surrounding a capsule containing deuterium-tritium (D-T) fuel causes implosion and compression of fuel to high density and then laser produced protons penetrate in the compressed fuel and deposit their energy in it as the ignition hot spot is created. In this paper, following the energy gain of spherical target and considering relationship of the burn fraction to burn duration, we have obtained the energy gain of conical targets characterized by the angle \( \beta \), and found a hemispherical capsule (\( \beta = \pi/2 \)) has a gain as high as 96% of that of the whole spherical capsule. The results obtained in this study are qualitatively consistent with Atzeni et al.’s studies of simulations.

Keywords: inertial fusion, D-T fuel, fast ignition, ignition hot spot, energy gain, conical targets

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