Quest for impact ignition and its future prospect


— Since the impact ignition has been proposed [1], we have achieved such crucial milestones under the operation of Gekko XII (ILE) and NIKE (NRL) laser systems as super-high-velocity acceleration of foils ranging 700-1000 km/s and hundred-fold increase in neutron yield by impact collision [2]. For the latter achievement, the kinetic energy of the impactor was efficiently converted into thermal energy generating a temperature of 1.6 keV. The use of Bromine-doped plastic target are key measure to suppress Rayleigh-Taylor instabilities and thus to achieve effective collisions. Based on these preliminary results, we have done two-dimensional hydrodynamic simulations to demonstrate that ignition occurs when impactor with a velocity beyond 1500 km/s and a density of 50 g/cm³ collides with main fuel with a density of 400 g/cm³, when the maximum impactor kinetic energy is 10 kJ.


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