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Quest for impact ignition and its future prospect MASAKATSU MURAKAMI, H. AZECHI, T. WATARI, T. SAKAIYA, K. OHTANI, K. TAKEDA, H. SHIRAGA, K. SHIGEMORI, S. FUJIOKA, H. NAGATOMO, T. JOHZAKI, ILE, Osaka Univ., J. GARDNER, J. BATES, A. VELIKOVICH, Y. AGLITSKIY, M. KARASIK, J. WEAVER, S. OBENSCHAIN, NRL, JAPAN-US IMPACT TEAM
— 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.

[1] M. Murakami and H. Nagatomo, Nucl. Inst. & Meth. Phys. Res. A544, 67 (2005).
[2] H. Azechi, et al., Phys. Rev. Lett. 102, 235002 (2009).

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