Abstract Submitted
for the DPP14 Meeting of
The American Physical Society

Fast Ignition by Photon-Pressure Accelerated Ion Beam TOMOYUKI JOHZAKI, Graduate School of Engineering, Hiroshima University, YASUHIKO SENTOKU, University of Nevada, Reno, ATSUSHI SUNAHARA, Institute for Laser Technology, TAKAMASA MORIKAWA, TAKUMA ENDO, Graduate School of Engineering, Hiroshima University — For enhancing the core heating efficiency in fast ignition, the ion beam generated by radiative pressure acceleration with circularly-polarized ultra-intense laser pulse is used as a core heating driver. In the present study, on the basis of the integrated simulations (PIC simulations for beam generation and Fokker-Planck simulations for core heating) and demonstrated the potential probability for C6+ beam driven fast ignition. From the coupled transport and hydro simulations, it is found that the beam particle (C6+) energy of 100 $\sim$ 200 MeV minimizes the beam energy required for ignition and the beam duration of $\sim$ 1 ps is suitable for ignition in terms of beam generation and core heating. From 2D PIC simulations for ion beam generation it is found that fast ion beam with ion energy of 210 MeV is obtained when the carbon target with the ion density of 90 ncr (ncr is the laser critical density) is irradiated with the CP laser with the intensity of $6x10^{22}W/cm^2$. In this case, 12% energy convergence efficiency of laser to ion beam is obtained. If assuming the laser spot of 24 micron diameter and pulse duration of 700fs, the required laser energy for beam generation is $\sim$190 kJ and the resultant beam energy of 23 kJ, which satisfy the beam condition required for ignition.

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Date submitted: 12 Jul 2014 Electronic form version 1.4