講演番号を入れてください

8P76

2倍波混合加熱レーザーを用いた高速点火加熱実験の進展

Development of curved Plasma Mirror on LFEX laser for Fast Ignition research.

Morace Alessio[1] ,Youichi Sakawa[1], Yasunobu Arikawa[1], Shinsuke Fujioka[1], Yasuhiko Sentoku[1], Natsumi Iwata[1], Tomoyuki Johzaki[2], Shinichi, Namba[2]

[1]Institute of Laser Engineering, Osaka University
[2]Hiroshima University

Fast Ignition represents an alternative approach to Inertial Confinement Fusion that promises to significantly increase the fusion yield while relaxing the fuel assembly constraints, regarding the symmetry of implosion and mixing.
In Fast Ignition the stages of compression and heating of the deuterium-tritium plasma are separated, and the heating is performed by an ultra-intense laser pulse, generating a bright and energetic particle beam (the so-called ignitor beam) that propagates through the plasma up to the compressed core, where it delivers the energy heating up the DT fuel.
The main problem related to this approach is to generate a bright enough (high laser-to-beam energy conversion efficiency) ignitor beam having at the same time high coupling efficiency (fraction of the ignitor beam energy deposited in the compressed core).
Typically, relativistic electrons or energetic proton beams have been considered as potential ignitor beam, but both lack the combined high conversion efficiency (for the protons) and high coupling efficiency (for the electrons) required to achieve ignition temperatures in the compressed plasma.
An alternative method involving an hybrid fast-electron-heavy ion approach has been envisioned. This method promises to achieve both high conversion efficiency and high coupling efficiency but requires extreme laser intensity ($I>10^{21}$ W/cm^2).

In this work we present the hybrid fast electron-ion approach and present the development of a curved plasma mirror that will allow to achieve extreme laser intensity in an inexpensive way using LFEX laser system. This work will also have important implications for laboratory astrophysics and particle acceleration by lasers.

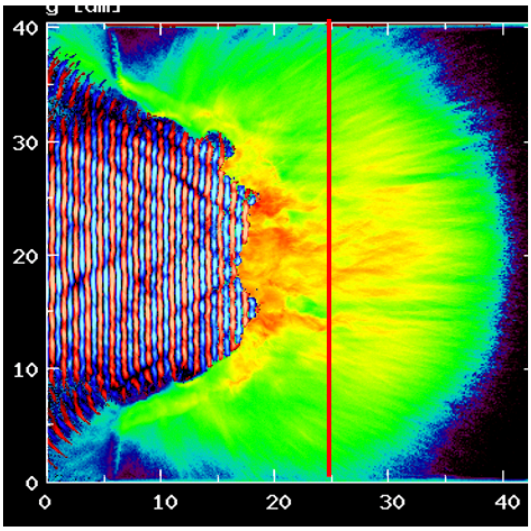

Fig1: Energy density for hybrid fast ignition approach.