Contribution ID: **3336** Type: **not specified**

P2.2024 Effects of laser focusing on plasma channeling by ultrahigh intense laser in fast ignition

Tuesday, 9 July 2019 14:00 (2 hours)

See the full abstract here
http://ocs.ciemat.es/EPS2019ABS/pdf/P2.2024.pdf

A target is imploded by long-pulse implosion lasers and its compressed core is heated by fast electrons, which are generated by a short-pulse ultrahigh-intense laser, in the fast ignition scheme. As the location where fast electrons are generated is far from the core due to ablation plasmas, few of them can hit the core. Therefore, a cone-guided target, which can shorten such distance, is used in FIREX experiments at ILE, Osaka University. On the other hand, it is reported that the ultrahigh-intense laser can penetrate into long-overdense plasma region due to relativistic transparency and self-focusing in many laser plasma experiments [1]. This so-called 'super-penetration' approach can open the possibility of direct irradiation fast ignition, which has significant advantages from the viewpoint of the reactor engineering.
The plasma channeling is one of key issues for the super-penetration approach, but it is well-known that the laser hosing instability, which disturbs stable laser propagation, occurs under such conditions. Thus characteristics of the laser propagation and plasma channeling in long plastic (CH) coronal plasmas and effects of laser focusing on plasma channeling are investigated by 2D PIC simulations. When the heating laser is tightly focused by small F-number optical system, the waist size becomes small and the peak laser intensity increases, resulting in formation of a sharp plasma channel. The magnetic field pressure is high enough to sustain the channel and stabilize the hosing instability. So efficient propagation of the ultrahigh-intense laser can be expected, and the direct irradiation scheme should be still investigated as the alternative way to cone-guided scheme in fast ignition.
This work is partially supported by JSPS KAKENHI Grant number JP15H05751, and is performed with the support and under the auspices of the NIFS Collaboration Research program (NIFS17KUGK110).

References
[1] H. Habara, et al., Plasma Phys. Contr. Fusion, 57, 064005 (2015).

pppo

Presenter: SAKAGAMI, H. (EPS 2019)

Session Classification: Poster P2

Track Classification: BPIF