Contribution ID: **3334** Type: **not specified**

P2.2022 Ignition requirement for HBRPA C6+ beam driven fast ignition

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

See the full abstract here
http://ocs.ciemat.es/EPS2019ABS/pdf/P2.2022.pdf
In fast ignition, an ultra-intense pico-second laser is irradiated to heat a pre-compressed fusion fuel up to the ignition temperature. When the laser-accelerated electron beam is used for core heating, the large beam divergence, the broad energy spectrum and the difficulty in generating fast electrons having suitable energy to the core heating inhibit the efficient core heating. One of the alternative core heating schemes is use of ion beam generated by the hole boring radiation pressure acceleration (HBRPA). The 1D theoretical and numerical predictions [1,2] showed that it is possible to accelerate ions to the energy suitable for the core heating with the small energy spread and the small angular divergence. However, the 2D PIC simulations [2,3] showed the broader energy spectrum, the larger angular divergence and the lower conversion than those obtained in the 1D predictions. In addition, there are no ignition requirement evaluations based on the integrated simulation including the ion acceleration, the core heating and the fusion burning. In the present study, we have evaluated the ignition requirement for HBRA-Carbonbeam-driven fast ignition by the integrated simulations where the ion beam properties were evaluated with 2D PIC simulations using picls2d [4] and the following core heating and fusion burn processes were simulated by a 2D hybrid code FIBMET [5]. In the conference, we will show the detailed dynamics of ion and also electron accelerations, core heating and fusion ignition, and the heating laser condition required for fusion ignition.

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Presenter: JOHZAKI, T. (EPS 2019)

Session Classification: Poster P2

Track Classification: BPIF