Integrated simulation analysis of core heating property for ion assisted fast ignition using low-density structured plastic foam

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To mitigate quite low energy coupling from fast electrons to the core, guiding fast electrons to the core by external magnetic field and improving pulse contrast of the heating laser are conducted at up-to-date FIREX experiments [1]. To enhance the core heating moreover, the ion assisted fast ignition scheme [2,3] is also suggested, where low-density structured plastic (CH) foam is introduced at the bottom of the cone to adapt the radiation pressure ion acceleration [4].

In recent FIREX experiments, solid ball targets are introduced to stably achieve compressed dense core instead of shell targets, and this target configuration also enables to remove the Au cone tip, in which extra energy loss and scattering of fast electrons occur during propagation. As collisional effects of ions in the cone tip are much larger than those of electrons, the tipless cone is very useful for ion assisted fast ignition. On the other hand, a longer pulse of the heating laser is going to be introduced to enlarge the total heating energy without increasing laser intensity. The longer pulse requires thicker foam to continuously obtain ion beams, but the stability of ion generation is still unknown for such long pulses. Thus integrated simulations should be carried out to evaluate core heating properties for there cases.

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