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# Preplasma influence on laser prepulse interaction with flat and 1D-grated targets.

Laser-driven experiments are strongly influenced by non ideal temproral profile of laser pulse. Laser main pulse is preceded by by low a long low intensity prepulse. Prepulse intensity is up to $10^{14}$ times smaller then main pulse intensity but its duration can reach 2.5 ns [1]. During the prepulse the target is heated up and preplasma appears in front of the target. Preplasma influences optical properties.

In our work we study the preplasma generation and expansion in front of grated and flat targets, and the reflectivity evolution during the prepulse-target interaction. We used radiation-hydrodynamic FLASH code to evaluate numerically the preplasma behavior. We use real temporal laser profile, to make simulation results closer to experiment. We compare the preplasma distribution in front of flat and 1D-grated targets. The preplasa in front of flat target reperestnt a thin dense layer along the targets surface. The preplasma density in front of grated target has nonuniform distribution, and is located between the grating elements and in front of the target. The analysis of preplasma evolution in time show that grated targets are heated more uniform and more efficient than the flat ones.

Moreover, we analyzed analytically and numerically the radiation absorption in preplasma-target ensemble. We deduced the reflectivity of grated targets using effective refractive index model and Bloch waves approximation. The reflectivity of grated target first decrease with preplasma generation and after increase, when the preplasma density reaches the critical value. The analytical model predictions are confirmet by numerical simulations.

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