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Recent progress of the HEDP research related to the astrophysics in China

JIE ZHANG¹, Institute of Physics, Chinese Academy of Sciences

The status of the HEDP research in China is reviewed, particularly of those related to the astrophysics studies. One of the two topics will be the confirmation of the atomic data critical when theoretical models are used to analyze the observed absorption spectra for astro-objects. Experiments were performed to measure the opacity of the SiO₂ plasma generated by the Planckian radiation in gold hohlraum targets irradiated by high power laser pulses. Details of the contributions from different Si ions to the specific components of the absorption spectra were studied. This work is helpful in analysis of the Chandra observatory spectra. The other topic is related to the source of cosmic particles of high energy. The shock acceleration is believed to be the possible mechanism providing initial velocities of the charged particles around the supernovae before they obtain higher energy in Fermi acceleration process. PIC codes were used to simulate the collisionless electrostatic shock (CLES) waves driven by ultra-intense laser pulses. The formation conditions of the CLES, its propagations in plasma, and the details of the ion acceleration process by CLES were studied. Such topics are also important issues in the fast ignition scheme of the inertial confinement fusion.

¹In collaboration with: Zhengming Sheng, Yutong Li, Quanli Dong, Xin Lu, Institute of Physics, Chinese Academy of Sciences.