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Experiments on energy flows in conical implosion

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In order to relax the requirements for compression and ignition processes, the double-cone ignition (DCI) scheme was proposed [1]. In the meantime, the conical configuration also allows carrying out irradiance-equivalent implosion experiments at much smaller laser facilities. It is therefore necessary to carefully investigate the outward/inward energy flows in the processes of the DCI scheme, for a conical irradiation on target shell by the specially shaped laser pulses. Here we present systematic experimental investigation on energy transport in a conical implosion at SG-II Up laser facility. The angular distribution of scattered energies with full-optical spectra are measured. The angularly integrated scattered energy indicates the total laser absorption could be as high as 94%. Light scattered in novel directions are affected by the coronal plasma conditions and the cone geometry. The detailed angular distribution of the scattered light is relevant to the spatially symmetrical characteristic of ablation dynamics. Inward energy transport is also investigated using a double-slope laser pulse for an isentropic compression. The measurements could provide insights into the energy flow trajectories in the conical implosion.

References

[1] J. Zhang, W. Wang, X. H. Yang, D. Wu, Y. Y. Ma, J. L. Jiao, Z. Zhang, F. Y. Wu, X.-H. Yuan, Y. T. Li, and J.-Q. Zhu, "Double-cone ignition scheme for inertial confinement fusion," *Phil. Trans. R. Soc. A.* **378**, 20200015–11 (2020).