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High-intensity laser driven collisionless electrostatic shock and ion acceleration in a multicomponent plasma

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Shock waves in space, such as in supernova remnants and the bow shock of the earth, are collisionless shocks generated in collisionless plasmas, which are one of the most promising candidates for the sources of cosmic rays. Thanks to the development of high-power lasers, a new method of studying high-energy astrophysics, such as the formation and evolution of collisionless shocks, in the laboratory, Laser Astrophysics, is emerging. Recently, high-intensity laser-driven collisionless electrostatic shock ion acceleration is drawing attention [1-4]. In this scheme, upstream ions of the shock are reflected and accelerated in by the shock potential. In this talk, collisionless electrostatic shock formation and ion acceleration in a near-critical density multi-component plasma are investigated both in the 2D particle-in-cell simulation and experiments.

References

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