Laser-driven electrostatic shocks: ion acceleration and fundamental studies.

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Recent works suggest that laser-driven electrostatic shocks constitute a very promising ion acceleration mechanism because in principle they could accelerate ions to very high energy with low energy spread and divergence [1, 2, 3]. This seminar will review how intense shocks can be excited in near-critical and underdense plasma targets [4, 3]. Multi-dimensional particle-in-cell simulations will be employed to infer how the ion beam quality can be controlled by tuning the laser parameters and the plasma density profile [5]. Simulation results will then be connected with recent experimental outcomes [4, 3]. Finally, it will be shown how this type of shocks, which are relatively easy to obtain in the laboratory, can provide insight into fundamental questions, as the interaction among collisionless shocks. Simulations indicate also that the very same setup exploited to investigate the binary collision between electrostatic shocks could be used to probe the electron Weibel instability in the laboratory [6].

References

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