

Abstract Submitted
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Non-relativistic collisionless shock formed by magnetic piston QUENTIN MORENO-GELOS, ANABELLA ARAUDO, VLADIMIR TIKHONTCHOUK, STEFAN WEBER, ELI-Beamlines, Institute of Physics, Czech Academy of Sciences, 5 Kvetna 835, 25241 Dolní Břežany, Czech Republic, ELI-BEAMLINES TEAM — By using PIC simulations we study the collision of two fast plasma flows with one of them carrying a magnetic field. Ion interpenetration results in the formation of a magnetic piston with the magnetic field compression proportional to the density ratio of the colliding plasmas. The thickness of the piston increases with time and it turns into a reverse magnetized shock after less than one ion gyro period. The counter-propagating ions in the non-magnetized plasma upstream the piston excite the ion Weibel instability, which is gradually transforming in the magnetic turbulence, isotropize the particles on several ion trapping periods and eventually form a forward electromagnetic shock. The two shocks of different nature have a common downstream region and propagate in opposite directions. Ion gyration in the reverse shock results in a periodic ejection of fast ions from the Weibel mediated shock, forming jets and continuing their acceleration upstream. The Weibel filaments penetrate the magnetic piston and form magnetic cavities filled with a hot plasma downstream the reverse shock. These two localized structures – jets and cavities – contribute to the particle acceleration, which is more efficient than the one taking place in a simple Weibel-mediated shock.

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