Abstract Submitted
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Weibel mediated collisionless shocks in laboratory with ultraintense lasers FREDERICO FIUZA, RICARDO A. FONSECA, LUIS O. SILVA, GoLP/IPFN - LA - Instituto Superior Tecnico, JOHN TONGE, WARREN B. MORI, UCLA — Weibel mediated collisionless shocks are believed to occur in many astrophysical scenarios, but the conditions for the generation of these shocks in laboratory are not yet fully understood. Using *ab initio* multi-dimensional relativistic PIC simulations, we show that Weibel mediated collisionless shocks can be driven in laboratory by the interaction of current/near-future high power laser pulses with overcritical plasmas. The laser acts like a piston, pushing the plasma and generating a flow of hot electrons that propagate through the target. The hot incoming flow and the cold counterstreaming flow (associated with the return current) go Weibel unstable leading to a strong compression and to the formation of a shock. The Weibel-driven magnetic fields reach 10% of equipartition with the upstream kinetic energy density, in good agreement with previous simulations of astrophysical scenarios. We demonstrate the possibility of controlling the shock properties by tuning the laser intensity and target density, opening the way for the first *in situ* study of Weibel mediated shocks.

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