Abstract Submitted
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Relativistic magnetic reconnection driven by a moderately intense laser interacting with a micro-plasma-slab.[1] LONGQING YI, Department of Physics, Chalmers University of Technology, BAIFEI SHEN, Department of Physics, Shanghai Normal University, ALEXANDER PUKHOV, Institut fuer Theoretische Physik I, Heinrich-Heine-Universitaet Duesseldorf, TNDE FLP , Department of Physics, Chalmers University of Technology — Magnetic reconnection (MR) in the relativistic regime is generally thought to be responsible for powering rapid bursts of non-thermal radiation in astrophysical events. It is therefore of significant importance to study how the field energy is transferred to the plasma to power the observed emission. However, due to the difficulty in making direct measurements in astrophysical systems or achieving relativistic MR in laboratory environments, the particle acceleration is usually studied using fully kinetic PIC simulations. Here we present a numerical study of a readily available (TW-mJ-class) laser interacting with a micro-scale plasma slab. The simulations show when the electron beams excited on both sides of the slab approach the end of the plasma structure, ultrafast relativistic MR occurs. As the field topology changes, the explosive release of magnetic energy results in emission of relativistic electron jets with cut-off energy ˜12 MeV. The proposed novel scenario can be straightforwardly implemented in experiments, and might significantly improve the understanding of fundamental questions such as field dissipation and particle acceleration in relativistic MR.

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