Contribution ID: **45** Type: **poster**

Relativistic magnetic reconnection driven by a laser interacting with a micro-plasma-slab

Wednesday, September 27, 2017 7:30 PM (1 hour)

Magnetic reconnection (MR) in the relativistic regime is generally thought to be responsible for powering rapid bursts of non-thermal radiation in astrophysical events such as pulsar winds and flares of blazars. Due to the difficulty in making direct measurements in astrophysical systems or achieving such extreme energy density conditions that are necessary to observe relativistic MR in laboratory environments, the particle acceleration process is usually studied by fully kinetic particle-in-cell (PIC) simulations. Here we present a numerical study using 3D PIC simulations of a readily available (TW-mJ-class) laser interacting with a micro-scale plasma slab. The simulations show that when the electron beams that are 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. A hard power-law electron energy distribution with index p~1.8 is observed. We propose a novel scenario that can be straightforwardly implemented in experiments, and might significantly improve the understanding of fundamental questions such as reconnection rate, field dissipation and particle acceleration in relativistic MR.

Primary author: LONGQING, Yi

Co-authors: Prof. PUKHOV, Alexander (Heinrich Heine Univeristy Duesseldorf); Prof. SHEN, Baifei (Shanghai institute of optics and fine mechanics); Prof. FÜLÖP, Tünde (Chalmers University of Technology)

Presenter: LONGQING, Yi

Session Classification: Wine and Poster Session 2 (WG4-WG5-WG6-WG7)

Track Classification: WG4 - Applications of Compact and High-Gradient Accelerators