

Proposition de stage

Laboratoire pour l'Utilisation des lasers intenses, UMR7605, Ecole Polytechnique, Palaiseau

Julien Fuchs, julien.fuchs@polytechnique.fr

Magnetized laboratory astrophysics

The overall project aims at addressing astronomy-relevant issues related to the coupling of expanding and colliding plasmas with dynamically important magnetic field. In particular (1) the collimation of compressible, magnetohydrodynamic flows by a magnetic field, and (2) the production of energetic particles and radiation by collisionless shocks or magnetic reconnection events, will be tackled. The possibility to study all these effects in the laboratory is a great opportunity to bring significant new results to compare with existing observations (e.g. collimated astrophysical jets, the production of high-energy particles in GRBs) and to simulations of these phenomena. For this, the project will take advantage of newly available experimental capabilities (high-power lasers coupled to pulsed strong magnetic fields) and exploit the results using 2D and 3D hydrodynamic, MHD and kinetic numerical simulations to get a complete picture of the phenomena. The intern will participate to various levels in this program, including an experiment that will be performed at LULI (Ecole Polytechnique), and possibly MHD simulations of the measured phenomena.