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MHD simulations of magnetized laser-plasma interaction for laboratory astrophysics[1] BENJAMIN KHIAR, ANDREA CIARDI, LERMA, Observatoire de Paris, PSL Research University, CNRS, Sorbonne Universits, UPMC Univ. Paris 06, F-75005, Paris, France, TOMMASO VINCI, GUILHEM REVET, JULIEN FUCHS, Laboratoire pour l'Utilisation des lasers Intenses, CNRS-CEA-Universit Paris VI-Ecole Polytechnique, Palaiseau, France, DREW HIGGINSON, Lawrence Livermore National Laboratory, Livermore, California 94440, USA — Laser-driven plasmas coupled with externally applied strong, steady-state, magnetic fields have applications that range from ICF to astrophysical studies of jet collimation, accretion shock dynamics in young stars and streaming instabilities in space plasmas. We have recently included the modelling of laser energy deposition in our three-dimensional, resistive two-temperature MHD code GORGON. The model assumes linear inverse-bremsstrahlung absorption and the laser propagation is done in the geometrical optics approximation. We present full scale numerical simulations of actual experiments performed on the ELFIE installation at LULI, including plasma generated from single and multiple laser plasmas embedded in a magnetic field of strength up to 20 T, and experiments and astrophysical simulations that have shown the viability of poloidal magnetic fields to directly result in the collimation of outflows and the formation of jets in astrophysical accreting systems, such as in young stellar objects.

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