5th Asia-Pacific Conference on Plasma Physics, 26 Sept-1Oct, 2021, Remote e-conference

Forming a supercritical magnetized collisionless shock using high-power lasers

R. Yamazaki[1,2], S. J. Tanaka[1], N. Ishizaka[1], S. Kakuchi[1], S. Sei[1], K. Sugiyama[1], K. Aihara[1], S. Kanbayashi[1], R. Shiina[1], Y. Sato[1], J. Shiota[1], K. Matsui[4], A. Takata[1], T. Sano[2], M. Ota[2], S. Egashira[2], T. Izumi[2], D. Ishihara[2], O. Kuramoto[2], Y. Matsumoto[2], K. Maeda[2], S. Matsukiyo[3], S. Isayama[3], T. Morita[3], H. Luo[3], M. Edamoto[3], T. Kojima[3], S. Matsuo[3], E. Kuramoto[3], T. Takezaki[4], T. Oguchi[4], K. Tomita[3], T. Minami[5], K. Sakai[5], T. Nishimoto[5], K. Iwasaki[5], K. Himeno[5], T. Taguchi[5], Y. Kuramitsu[5], K. Tomita[6], N. Ohnishi[7], T. Umeda[8], Y. Ohira[9], A. Ishii[10], Y. Sakawa[2]

[1]Department of Physical Sciences, Aoyama Gakuin University, [2]Institute of Laser Engineering, Osaka University, [3]Faculty of Engineering Sciences, Kyushu University, [4]Faculty of Engineering Sciences, University of Toyama, [5]Graduate School of Engineering, Osaka University, [6]Division of Quantum Science and Engineering, Hokkaido University, [7]Department of Aerospace Engineering, Tohoku University, [8]Institute for Space-Earth Environmental Research, Nagoya University, [9]Department of Earth and Planetary Science, The University of Tokyo, [10]Max Planck Institute for Gravitational Physics (Potsdam)

e-mail: ryo@phys.aoyama.ac.jp

Collisionless shocks are ubiquitous in various astrophysical, heliospheric, solar-terrestrial, and laboratory phenomena. The dissipation mechanism as well as particle acceleration there is not yet clarified as of yet. Recently, laboratory astrophysics has developed, reproducing collisionless shocks in the laboratory. It is outstanding that physical parameters like Mach number and plasma beta are controllable. Although this potential ability of the laboratory experiment is attractive, the methodology of experiments or the data analysis techniques have not been well established. Here we present our recent attempt to excite a collisionless shock propagating into magnetized plasma at rest using Gekko XII kilo-Jule-class high-power lasers at Osaka University. With a help of laser Thomson scattering and plasma self emission measurements, we see a possible signature of the collisionless shock with Alfven Mach number of around 15.