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# Laser experiments to simulate coronal mass ejection driven magnetospheres and astrophysical plasma winds on compact magnetized stars

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Abstract

Laboratory experiments using a plasma wind generated by laser–target interaction are proposed to investigate the creation of a shock in front of the magnetosphere and the dynamo mechanism for creating plasma currents and voltages. Preliminary experiments are shown where measurements of the electron density gradients surrounding the obstacles are recorded to infer the plasma winds. The proposed experiments are relevant to understanding the electron acceleration mechanisms taking place in shock-driven magnetic dipole confined plasmas surrounding compact magnetized stars and planets. Exploratory experiments have been published [P. Brady, T. Ditmire, W. Horton, et al., Phys. Plasmas 16, 043112 (2009)] with the one Joule Yoga laser and centimeter sized permanent magnets.