Abstract Submitted
for the GEC20 Meeting of
The American Physical Society

Friction and electrical conduction in strongly magnetized plasmas[1] SCOTT BAALRUD, Univ of Iowa, TREVOR LAFLEUR, PlasmaPotential — Frictional drag on a particle due to its interaction with the medium through which it travels is commonly expected to act antiparallel to its velocity. Recent work has shown that a qualitatively different effect arises in strongly magnetized plasmas, whereby the friction force gains a transverse component that is perpendicular to the velocity vector in the plane formed by the velocity and magnetic field vectors [1]. The transverse force arises due to the manner in which the Lorentz force influences the dielectric polarization of the background plasma. It is large when the electron gyrofrequency significantly exceeds the plasma frequency. It causes the gyroradius of fast particles to increase, and that of slow particles to decrease faster than in its absence. The alteration of single particle motion leads to qualitatively new macroscopic transport properties. As an example, we show that it leads to a new transverse component of electrical resistivity that alters the flow of current in response to an applied electric field. [1] Lafleur and Baalrud, PPCF 61, 125004 (2019).

[1]This work was supported by the U.S. Department of Energy, Office of Fusion Energy Sciences under Award Number DE-SC0016159.

Scott Baalrud
Univ of Iowa

Date submitted: 10 Jun 2020 Electronic form version 1.4