

Abstract Submitted
for the GEC18 Meeting of
The American Physical Society

Student Excellence Award Finalist: Phase mixing and collisionless dissipation at the plasma boundary sheath of magnetized low temperature plasmas¹ DENNIS KRUEGER, RALF PETER BRINKMANN, Ruhr-University Bochum — One important example of magnetized low temperature plasmas is high power impulse magnetron sputtering (HiPIMS). The regime is characterized by $n_e \leq 10^{19} \text{ m}^{-3}$, $p \approx 0.5 \text{ Pa}$ and the occurrence of symmetry breaking phenomena (spokes). Conventional kinetic approaches like particle-in-cell (PIC) methods are too resource consuming to simulate relevant time scales. One possible alternative makes use of the fact that the electron Larmor radius r_L is small compared to the typical length scale L of the system. This ansatz, however, breaks down at the plasma boundary sheath in front of the target. A hard wall model might be an effective boundary condition for the interaction of magnetized electrons with this interface [I,II]. Scattering matrices obtained for different inclination angles of the magnetic field relate the incoming to the outgoing electron velocity distribution function (EVDF). An interesting feature which can be observed in the outgoing EVDF are fractal type structures which disappear due to phase mixing about a distance of some Larmor radii away from the sheath edge.

I D. Krüger et al., Plasma Sources Sci. Technol. 26, 115009 (2017)

II D. Krüger et al., Plasma Sources Sci. Technol. 27, 025001 (2018)

¹This work is supported by the German Research Foundation in the frame of the Collaborative Research Center TRR 87.

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Date submitted: 10 Jul 2018

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