Abstract Submitted
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Student Award Finalist - Instability and Inversion of the Sheath Potential Caused by Electron Emission[1] MICHAEL CAMPANELL, Princeton Plasma Physics Laboratory, HONGYUE WANG, Beihang University, ALEX KHRABROV, IGOR KAGANOVICH, Princeton Plasma Physics Laboratory — Most theories of PSI with electron emission assume a temporally stable sheath exists and the plasma potential is positive relative to the wall [1]. Ions are assumed to be drawn to the wall via Bohm's criterion and the emission is treated as a fixed "coefficient." We show if the emission is sufficiently strong, the presheath may disappear because there is no need for ions to reach the wall to maintain current balance or plasma shielding. In this "inverse sheath" regime, the wall charge is positive and the shielding charge is negative. The plasma potential is negative, ions are confined and plasma electrons are unconfined [2]. We also present simulations and theory on a class of sheath instabilities driven by secondary emission that can arise under general conditions [3,4]. Lastly, we analyze effects of emitted electrons transiting between surfaces in bounded plasmas; transit alters flux balance [5] compared to PSI models of one emitting wall [1].

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[3] M.D. Campanell,et al., PRL 108, 235001 (2012).
[4] M.D. Campanell, et al., POP 19, 123513 (2012).
[5] M.D. Campanell and H. Wang, submitted to APL (2013).

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