Abstract Submitted
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Observation of an abrupt electron heating mode transition in capacitive single radio frequency discharges[1] SEBASTIAN WILCZEK, JAN TRIESCHMANN, JULIAN SCHULZE, RALF PETER BRINKMANN, THOMAS MUSSENBROCK, Ruhr University Bochum, ARANKA DERZSI, IHOR KOROLOV, ZOLTAN DONKÓ, Wigner Research Center for Physics, Budapest — The electron heating in capacitive discharges at very low pressures (≈1 Pa) is dominated by stochastic heating. In this regime electrons are accelerated by the oscillating sheaths, traverse through the plasma bulk and interact with the opposite sheath. By varying the driving frequency or the gap size of the discharge, energetic electrons reach the sheath edge at different temporal phases, i.e., the collapsing or expanding phase, or the moment of minimum sheath width. This work reports numerical experiments based on Particle-In-Cell simulations which show that at certain frequencies the discharge switches abruptly from a low density mode in a high density mode. The inverse transition is also abrupt, but shows a significant hysteresis. This behavior is explained by the complex interaction of the bulk and the sheath.

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