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Experimental confirmation of transitions in the discharge operation mode in low-pressure capacitively coupled Ne plasmas[1] BENEDEK HORVTH, Wigner Research Centre for Physics, ARANKA DERZSI, Wigner Research Centre for Physics; West Virginia University, JULIAN SCHULZE, West Virginia University; Ruhr-University, PETER HARTMANN, Wigner Research Centre for Physics, IHOR KOROLOV, Ruhr-University, ZOLTAN DONKO, Wigner Research Centre for Physics — In this work, the electron power absorption and ionization dynamics in low-pressure discharges operated in Ne are studied and a detailed comparison of simulated and experimental results is provided in a wide parameter regime. 1d3v PIC/MCC simulations and PROES measurements are performed at different driving frequencies, pressures and voltage amplitudes in a geometrically symmetric CCP reactor. Both in simulations and experiments, a transition of the discharge operation mode from α to γ is found by increasing the voltage amplitude at a fixed frequency and pressure, as well as by increasing the pressure at a fixed frequency and voltage amplitude. However, the simulations and the experiments suggest different voltage amplitudes/pressures at which the transition happens. This study reveals the applicability of PROES (which provides the spatio-temporal distribution of the excitation dynamics of the Ne 2p1 state) to probe the discharge operation mode (which is determined by the spatio-temporal distribution of the ionization dynamics) under various discharge conditions.

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