

Abstract Submitted
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New insights into electron heating and ionisation mechanisms in CCP discharges at low pressures¹ DEBORAH O'CONNELL, TIMO GANS, UWE CZARNETZKI, Institute for Plasma and Atomic Physics, CPST, Ruhr-University Bochum, Germany, DAVID VENDER, Port Arthur, Tasmania, Australia, ROD BOSWELL, SP3/RSPHYSSE, ANU, Canberra, Australia — Details on plasma sustainment of capacitively coupled plasmas (CCPs), at relatively low pressures when regular ohmic heating is not efficient, are an open question for decades. The main difficulty has been the extreme diagnostics challenge. Recent advances in phase resolved optical emission spectroscopy (PROES) has allowed detailed spatio-temporal investigations of the electron dynamics, on a nano-second time scale, within the RF cycle. PROES and particle-in-cell (PIC) simulation results show that at comparatively low pressures (< 10 Pa) the main ionisation channel in CCPs is via a large amplitude electron beam plasma interaction powered by the electric field of the sheath expansion into the plasma. Following this interaction and its associated waves and plasma ionisation, a resonance at the sheath edge is observed in both the PIC simulation and PROES measurements.

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Timo Gans
Ruhr-University Bochum

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