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Student Excellence Award Finalist: Electron heating in asymmetric capacitively coupled RF discharges at low pressures JULIAN SCHULZE, BRIAN HEIL, DIRK LUGGENHOELSCHER, UWE CZARNETZKI, Ruhr-University Bochum — Electron dynamics in asymmetric capacitively coupled discharges is investigated by applying a combination of various diagnostics: Laser electric field measurements for the sheath, phase resolved optical emission spectroscopy for the excitation, Langmuir probe measurements for the EEDF and electron density in the bulk, a SEERS sensor for current measurements and a high voltage probe for the determination of the applied voltage. During the sheath expansion beams of high energetic electrons are observed. At low pressures the RF current is not sinusoidal, but strong high frequency oscillations caused by the Plasma Series Resonance (PSR) effect are observed. These current oscillations increase the sheath velocity and enhance stochastic heating. The current is compared to emission measurements showing a direct correlation. The electric field measurements are compared to a fluid sheath model. The measured RF current is compared to an analytical PSR model. Another analytical model demonstrates the influence of electron beams on the time averaged isotropic EEDF as it is measured by probes. It clearly demonstrates, that high energetic electron beams lead to an enhanced high energy tail, that is usually attributed to stochastic heating.

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