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On the Significance of Metastable States in Low Pressure Capacitively Coupled Oxygen Discharges JON GUDMUNDSSON, HOLMFRIDUR HANNESDOTTIR, University of Iceland — We use the one-dimensional object-oriented particle-in-cell Monte Carlo collision code `oopd1` to explore the spatio-temporal evolution of the electron heating mechanism in a capacitively coupled oxygen discharge in the pressure range 10 – 200 mTorr. The electron heating is most significant in the sheath vicinity during the sheath expansion phase. We explore how including and excluding detachment by the singlet metastable states $O_2(a^1\Delta_g)$ and $O_2(b^1\Sigma_g^+)$ influences the heating mechanism, the effective electron temperature and electronegativity, in the oxygen discharge. We demonstrate that the detachment processes have a significant influence on the discharge properties, in particular for the higher pressures. At 10 mTorr the time averaged electron heating shows mainly ohmic heating in the plasma bulk (the electronegative core) and at higher pressures there is no ohmic heating in the plasma bulk, that is electron heating in the sheath regions dominates.

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