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**Three-body recombination and dynamics of electrons and excited states in the low-pressure argon afterglow**[1] TSANKO VASKOV TSANKOV, Institute for Plasma and Atomic Physics, Ruhr University Bochum, 44780 Bochum, Germany, RAINER JOHNSEN, Department of Physics and Astronomy, University of Pittsburgh, Pittsburgh PA 15260, USA, UWE CZARNETZKI, Institute for Plasma and Atomic Physics, Ruhr University Bochum, 44780 Bochum, Germany
— The afterglow phase occurs naturally during the power-off period in pulsed low-pressure plasmas and in atmospheric pressure ns discharges. During that period the electron energy rapidly declines and the charged particles are lost due to diffusion and recombination. In low-pressure discharges the dominant process is three-body recombination (TBR) of $Ar^+$ ions with electrons. It leads to complex dynamics of the excited states, dominated by collisional-radiative cascades that eventually repopulate the metastable states. In this contribution the afterglow dynamics of an argon discharge is analyzed in detail to elucidate the roles played by the various processes. An analytical model for the fast drop of the electron energy by evaporative cooling and electron-ion collisions is combined with a time-dependent collisional radiative model for the atomic excited states that numerically solves the electron energy and density balance equations. By including further gas heating and cooling, the model leads to excellent agreement with experiments utilizing different diagnostic techniques, and hence gives insight into the interplay of the various processes in the afterglow [2]

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[2]Ts V Tsankov, R Johnsen, and U Czarnetzki, *PSST* **24** (2015) 065001.

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