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Electron-impact population transfer rates between metastable and resonance states of argon NADER SADEGHI, LTM & LIPhy, Univ. Grenoble & CNRS, France, EMILE CARBONE, EDDIE VAN VELDHUIZEN, GERRIT KROESEN, TUE, Eindhoven, Netherlands — Electron-impact population transfer between metastable and resonance 1s states of argon is studied by time resolved laser pump-probe technique in a surfatron generated argon plasma. A nanosecond laser pulse tuned to a 1s-2p or 1s-3p transition depletes one of the 1s metastable or resonance states of argon and the time variations of the densities in that state and the other three 1s states are then simultaneously monitored by laser absorption diagnostic with different cw diode lasers. Plasma parameters are: 6 mm diameter plasma tube, p=5-20 mbar, n_e =1-6 x 10^{19} m^{-3}, T_e =1-2 eV. At such high n_e values e-impact transfers between 1s states dominates over all other loss processes, *i.e.* diffusion, Ar-impact transfers and radiative losses. A simple collisional-radiative model is used to deduce the transfer rates from the time evolution of the densities in the four 1s states following the pulsed laser depletion. At $T_e \geq$1.2 eV, k_{ij} rate coefficients (in units of 10^{19} $m^3.s^{-1}$), for transfers between metastables and neighboring resonance states are k_{54} =1.6 and k_{32} =9, respectively. The population transfer with change of ion-core is weak for $1s_2$ to $1s_5$ ($k_{25}<<1$) but resonance states are efficiently mixed, k_{24} =k_{42} =2. Recent quantum mechanical calculation by Zatsarinny *et al* seems to underestimate by factor 2 or more the corresponding cross-sections.

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