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Emission Rates in ASTRAL Argon Plasmas. OLA KAMAR, ROBERT BOIVIN, STUART LOCH, JORGE MUNOZ, Department of Physics, Auburn University, 206 Allison Laboratory, Auburn, Alabama 36949-5311, CONNOR BALLANCE, Department of Physics, Rollins College, White Park, Florida 32789 — Relative Emission rates measured in the ASTRAL (**A**uburn **S**teady s**T**ate **R**esearch f**A**ci**L**ity) helicon plasma source are compared to theoretical predictions. A spectrometer which features a 0.33 m Criss-Cross Scanning monochromator and a CCD camera is used for this study. ASTRAL produces bright intense Ar plasmas with the following parameters: $n_e = 10^{12}$ to 10^{13} cm^{-3} and $T_e = 2$ to 10 eV. A rf compensated Langmuir probe is used to measure T_e and n_e. In a first series of experiment Ar I, Ar II and Ar III transitions are monitored as a function of plasma density and this for constant electron temperature. In the second series of experiments, the same transitions are observed as a function of T_e while n_e is this time kept constant. Observations revealed that T_e is by far the most significant parameter affecting the emission rate coefficients in the ASTRAL plasma. The spectroscopy measurements are compared with spectral modeling from the ADAS suite of codes. Our collisional-radiative formalism assumes that the excited levels are in quasi-static equilibrium with the ground and metastable populations. We use existing standard R-matrix electron-impact excitation data in our modeling, and assess this dataset against the results from a new R-matrix with pseudo-states calculation.

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