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**Ar II Emission Processes and Emission Rate Coefficients in
ASTRAL Helicon Plasmas** R.F. BOIVIN, A. GARDNER, O. KAMAR, A.
KESTERSON, S. LOCH, J. MUNOZ, Physics Department, Auburn University,
206 Allison Laboratory, Auburn, AL 36849, C. BALLANCE, Physics Department,
Rollins College, White Park, FL 32789 — Emission processes for Ar II line emis-
sion are described for low temperature plasmas ($T_e < 10$ eV). It is found that Ar
II emission results primarily from Ar ion ground state excitation rather than from
any Ar neutral state. This suggests that Ar II emission results from stepping pro-
cesses which includes ionization and then excitation of the neutral Ar atom filling
the vacuum chamber. The Ar II emission rate coefficients are measured in the AS-
TRAL helicon plasma source using a 0.33 m monochromator and a CCD camera.
ASTRAL produces Ar plasmas with the following parameters: $n_e = 1E11 - 1E13$
cm⁻³ and $T_e = 2 - 10$ eV, B-field ≤ 1.3 kGauss, rf power ≤ 2 kWatt. RF com-
pensated Langmuir probes are used to measure T_e and n_e . In this experiment, Ar
II transitions are monitored as a function of T_e while n_e is kept constant. Experi-
mental emission rates are obtained as a function of T_e and compared to theoretical
predictions. Theoretical predictions make use of the ADAS suite of codes as well as
recent R-matrix electron-impact excitation calculations that includes pseudo-states
contributions. Our collisional-radiative formalism assumes that the excited levels
are in quasi-static equilibrium with the ground and metastable populations.

Robert Boivin
Auburn University

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