Abstract Submitted
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An investigation into the role of metastable states on excited populations of weakly ionized argon plasmas, with applications for optical diagnostics.[1] NICHOLAS ARNOLD, STUART LOCH, Auburn University, CONNOR BALLANCE, Queen's University Belfast, ED THOMAS, Auburn University — Low temperature plasmas ($T_e < 10\ eV$) are ubiquitous in the medical, industrial, basic, and dusty plasma communities, and offer an opportunity for researchers to gain a better understanding of atomic processes in plasmas. Here, we report on a new atomic dataset for neutral and low charge states of argon, from which rate coefficients and cross-sections for the electron-impact excitation of neutral argon are determined. We benchmark by comparing with electron impact excitation cross-sections available in the literature, with very good agreement. We have used the Atomic Data and Analysis Structure (ADAS) code suite to calculate a level-resolved, generalized collisional-radiative (GCR) model for line emission in low temperature argon plasmas. By combining our theoretical model with experimental electron temperature, density, and spectral measurements from the Auburn Linear eXperiment for Instability Studies (ALEXIS), we have developed diagnostic techniques to measure metastable fraction, electron temperature, and electron density. In the future we hope to refine our methods, and extend our model to plasmas other than ALEXIS.

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