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New level-resolved collision data for neutral argon, benchmarked against the ALEXIS plasma experiment.[1] NICHOLAS ARNOLD, STUART LOCH, Auburn University, CONNOR BALLANCE, Queen's University Belfast, ED THOMAS, Auburn University — Performing spectroscopic measurements of emission lines in low temperature laboratory plasmas is challenging because the plasma is often neutral-dominated and not in thermal equilibrium. The densities and temperatures are such that coronal models do not apply; meaning that generalized collisional-radiative (GCR) methods must be employed to theoretically analyze atomic processes. However, for most noble gases, detailed, level-resolved atomic data for neutral and low-charge states does not exist in the literature. We report on a new project, where we use existing atomic physics codes to calculate level-resolved atomic data for neutral and low charge states of argon and compare with previously published, term-resolved theoretical results. In addition, we use the Atomic Structure and Data Analysis (ADAS) suite of codes to calculate a GCR model for low temperature neutral argon, which we compare to published measurements of argon optical emission cross sections. Finally, we compare synthetic spectra generated from our data with observations taken from the Auburn Linear Experiment for Instability Studies (ALEXIS) in an attempt to develop new optical plasma diagnostics for electron temperature and plasma density measurements.

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Nicholas Arnold
Auburn University

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