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Atomic modeling and spectral analysis of the Auburn Linear Experiment for Instability Studies (ALEXIS)[1] N. IVAN ARNOLD, ED THOMAS, STUART LOCH, CONNOR BALLANCE, Auburn University — Performing spectroscopic measurements of emission lines in relatively cold laboratory plasmas is challenging because the plasma is often neutral-dominated and is not in thermal equilibrium. However, these types of plasma do offer a unique opportunity for benchmarking the finer details of atomic physics, helping researchers gain a better understanding of fundamental atomic processes in plasmas. In this presentation, we report on a new set of atomic data, from which rate coefficients for the electron-impact excitation of neutral argon, along with dielectronic recombination of Ar+-Ar5+ are determined. This data is used to calculate synthetic emission spectra, which are compared to experimental measurements in the ALEXIS device. The goal is to identify emission lines that are sensitive to variations in temperature and density and to use this data to develop a new optical density and temperature diagnostic for a low temperature plasma. This presentation will discuss preliminary density and temperature measurements made using the atomic data, with comparisons to standard probe based measurements and will report on recent modifications to ALEXIS intended to allow for a more complete test of the atomic model.

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