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Laser Spectroscopy of bi-alkali molecules SOURAV DUTTA, A. ALTAF, J. LORENZ, D. ELLIOTT, YONG CHEN, Purdue University — We report a study of laser spectroscopy of bi-alkali molecules, such as Li_2, Rb_2 and LiRb (work is in progress). We have constructed a dual-species (Li/Rb) heat pipe oven with a side viewport. The molecular fluorescence is excited by a dye laser with Rh6G dye (operating between 564 nm and 610 nm) and various home-made diode lasers (operating near 635 nm and 665 nm). The fluorescence is recorded using a $1/4$ m monochromator with a 0.1 nm (~ 3 cm^{-1}) spectral resolution. Transitions to the $X^1\Sigma_g^+$ in Li_2 and Rb_2 have been measured and studies on LiRb are in progress. Molecular parameters, such as force constant, may be obtained from the analysis of the data (which agree with previously known values to within $\sim 3\%$). Using the known values of dissociation energy D_e and harmonic frequency ω_e for the alkali dimers, we also demonstrate that simple calculations with Morse potential approximation can be used to estimate the molecular transition wavelengths to within a few (1-3) nanometers from the experimentally measured values. Such information will aid in creating cold molecules via photoassociation in a dual species magneto-optical trap (LiRb in our case).

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