THE $X^1\Sigma^+$ AND $B^1\Pi$ STATES OF LiRb AND PROSPECTS FOR CREATING ULTRACOLD GROUND STATE LiRb MOLECULES

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We present a spectroscopic study of the $X^1\Sigma^+$ and $B^1\Pi$ states of LiRb. LiRb molecules were formed in a heat-pipe oven and spectroscopic measurements of the laser induced fluorescence (LIF) were performed. LIF to the first 45 vibrational levels of the $X^1\Sigma^+$ state (covering more than 98% of the potential well depth) was observed. We also studied the excitation to the $B^1\Pi$ state with high resolution excitation spectroscopy. The values of vibrational, rotational and other spectroscopic constants for both $X^1\Sigma^+$ and $B^1\Pi$ states will be presented in addition to their dissociation energies. Measurements aimed to probe perturbations in the $B^1\Pi$ state due to other nearby states will be discussed. The use of such spectroscopic information in finding efficient photoassociation pathways for the production of ultracold LiRb molecules will also be discussed. This work is supported by the NSF grant number CCF0829918.