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Experimental progress toward making ground-state ultracold KRb molecules DAJUN WANG, COURT ASHBAUGH, E.E. EYLER, P.L. GOULD, W.C. STWALLEY, Physics Department, University of Connecticut, Storrs, CT 06269 — We propose a promising route for transferring ultracold $X\ ^1\Sigma^+$ KRb molecules in high vibrational levels (formed via photoassociation) to the true ground state ($X\ ^1\Sigma^+$, v=0, J=0) with two cw lasers. Using pulsed two-color two-photon ionization, we have identified transitions from high-v levels of the X state to the $3\ ^1\Sigma^+$ state. Our calculations show that several of the observed $3\ ^1\Sigma^+$ vibrational levels have good Franck-Condon factors for emission to v=0 of the X state. This makes the $3\ ^1\Sigma^+$ state a good candidate for the intermediate state in Raman population transfer. Furthermore, using a combination of pulsed resonance-enhanced one-color two-photon ionization and cw laser depletion, we have achieved rotational resolution of these transitions. With the addition of another cw laser to connect the X state v=0, J=0 level to an intermediate rovibrational level, we expect to selectively produce translationally, vibrationally and rotationally ultracold KRb molecules. This work was supported by NSF.

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