State-selective detection of ultracold KRb molecules in near-dissociation vibrational levels

D. WANG, E.E. EYLER, P.L. GOULD, W.C. STWALLEY, Physics Department, University of Connecticut — Using resonance-enhanced one-color two-photon ionization, we have detected ultracold polar KRb molecules with vibrational selectivity. The KRb molecules are produced by photoassociation (PA) followed by radiative decay to either $X^1\Sigma^+$ ground state or the metastable triplet $a^3\Sigma^+$ state[1]. The distribution of final states can be modified by selecting different PA resonances, which radiate to various near-dissociation vibrational levels in the $X$ and $a$ states, following the Franck-Condon principle. We have obtained long range bound-bound excitation spectra of these molecules, which also provide the first spectroscopic data on the $(4)^1\Sigma^+$ shelf state, the $(4)^3\Sigma^+$ state and the $(3)^3\Pi$ state. Analysis of our spectra shows vibrational spacings in these excited states in good agreement with those calculated from \textit{ab initio} potential curves. We acknowledge support from NSF.