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Photonionization Spectroscopy of Electrostatically Trapped, Ultracold Polar Molecules in the Electronic Ground State PATRICK ZABAWA, AMY WAKIM, CHRISTOPHER HAIMBERGER, JAN KLEINERT, NICHOLAS P. BIGELOW, University of Rochester — We have observed ultracold, electrostatically trapped NaCs occupying a wide range of vibrational levels in the $X^1\Sigma^+$ state. Ultracold NaCs is prepared from magneto-optical traps (MOTs) via photoassociation with a laser field detuned from the Cs $6S_{1/2} - 6P_{3/2}$ transition. Rotationally cold (from $J = 1$ to $J \approx 6$) molecules are continuously loaded into a Thin Wire Electrostatic Trap (TWIST) which is spatially mode-matched with the MOTs. Using Resonance Enhanced Multi-Photon Ionization (REMPI), bound-bound transitions are detected between 16400 and 18200 cm^{-1}. The creation of both bound molecular ions and photofragments from trapped molecules occurs at these ionization energies, which is consistent with both two- and three-photon excitations from the ground state. An analysis of the spectrum indicates the presence of trapped $X^1\Sigma^+$ molecules populating vibrational levels from $v \approx 23$ down to the ground state.

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