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Vibrational State Transfer in Ultracold NaCs AMY WAKIM, PATRICK ZABAWA, University of Rochester, JENNIFER HANSEN, Grove City College, AMANDA NEUKIRCH, NICHOLAS BIGELOW, University of Rochester — Ultracold polar NaCs molecules are formed via photoassociation through a resonance 23 GHz detuned from the Cs $6^2P_{3/2}$ asymptote from overlapped dark-spot Magneto-Optical Traps. Using a vibrational state selective detection method, we have determined the sample consists of ν=4-19 in the $X^1\Sigma^+$ electronic ground state. We will report on an optical pumping method designed to transfer this initial distribution of vibrational levels to maximize the ν=0 population. A simple model of optical pumping using the $A^1\Sigma^+$ - $b^3\Pi$ complex is used to predict that the population will accumulate in the ν=0 state if the sample is illuminated with light at roughly 1 micron with a 10 nm spectral range. Most importantly, the pulse frequency must be shaped to exclude transitions out of the ν=0 level in order to create a dark state where the population will accumulate [1].

[1] D. Sofikitis, et al. PRA 80 051401 (2009)

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