Rovibrational Optical Pumping of NaCs

MAREK HARUZA, PATRICK ZABAWA, AMY WAKIM, NICHOLAS BIGELOW, University of Rochester, Rochester, NY — We demonstrate efficient cooling of the rotational degree of freedom of ultracold NaCs molecules through narrow line optical pumping. Molecules in $v''=0$, $N''=2$ and 4 are excited to the lowest vibrational level of the $A^1\Sigma^+-b^3\Pi$ complex from which they decay to $v''=0$, $N''=0$. We achieve cooling of both rotational and vibrational degrees of freedom by applying this technique in conjunction with broadband optical pumping [1]. This technique also allows transfer of population between any of the lowest vibrational states ($v''=0$-2) at kHz rates.