

Abstract Submitted  
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**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.

[1] D. Sofikitis, R. Horchani, X. Li, M. Pichler, M. Allegrini, A. Fioretti, D. Comparat, and P. Pillet, Phys. Rev. A 80, 051401(R) (2009)

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