Abstract Submitted
for the DAMOP12 Meeting of
The American Physical Society

Experimental Studies of High Lying Electronic State of NaCs[1]
CARL FAUST, JOSHUA JONES, Lehigh University, SETH ASHMAN, University of Wisconsin - Madison, KARA RICHTER, BRETT MCGEEHAN, A.P. HICKMAN, JOHN HUENNEKENS, Lehigh University — We present new results from experimental studies of high-lying electronic states of the NaCs molecule that are currently underway in our laboratory. The optical-optical double resonance method is used to obtain Doppler-free excitation spectra for several excited states. Selected data from the $5^3\Pi_0$, $4^3\Pi_0$ and other high lying electronic states are used to obtain Rydberg-Klein-Rees (RKR) and Inverse Perturbation Approach (IPA) potential curves. Small oscillations in the other wall of the $5^3\Pi_0$ potential suggest strong interactions with other electronic states. A modified version of Le Roy's BCONT program was used to simulate NaCs $5^3\Pi_0 \rightarrow 1(a)^3\Sigma^+$ bound-free emission spectra. These simulations were used to fit the experimental spectra with a parameterized $1(a)^3\Sigma^+$ repulsive wall and the $5^3\Pi_0 \rightarrow 1(a)^3\Sigma^+$ transition dipole moment function, $\mu(R)$. The fitted $\mu(R)$ is in good agreement with the theoretical transition dipole moment function of Aymar and Dulieu [Mol.Phys. **105**, 1733 (2007)]. In related work, we have identified additional electronic states which we have tentatively assigned as the $4^3\Pi_0$ and $5^3\Pi_1$ (and possibly the $5^3\Pi_2$) electronic states of NaCs.

[1]Work supported by the National Science Foundation.

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Date submitted: 27 Jan 2012 Electronic form version 1.4