Abstract Submitted
for the DAMOP15 Meeting of
The American Physical Society

Quantum Interference due to Two-stage Coupling of Electronic States in NaCs CARL FAUST, Susquehanna University, JOSHUA JONES, Colgate University, JOHN HUENNEKENS, Lehigh University — We present new results from experimental studies of high-lying electronic states of the NaCs molecule. The optical-optical double resonance method is used to obtain Doppler-free excitation spectra for several excited states. Selected data from the $11(0^+)$ and $12(0^+)$ high lying electronic states are used to obtain Rydberg-Klein-Rees (RKR) and Inverse Perturbation Approach (IPA) potential curves. Interactions between these two electronic states are evident in the patterns observed in the bound-bound and bound-free fluorescence spectra. A two-stage coupling model is presented to describe how the wavefunctions of the two states mix. The electronic parts of the wavefunction interact via spin-orbit coupling, while the individual ro-vibrational levels interact via a second, different mechanism, likely nonadiabatic coupling. The interference between components of these mixed wavefunctions results in resolved fluorescence that is more complicated than one would predict from the pure electronic states. A modified version of the BCONT program (R. J. Le Roy, University of Waterloo) was used to simulate resolved fluorescence from both upper states. Parameters describing the two-stage coupling were varied until simulations were able to adequately reproduce experimental spectra.

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Date submitted: 26 Jan 2015 Electronic form version 1.4