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Experimental Studies of the NaCs $5^{3}\Pi_{0}$, $4^{3}\Pi_{0}$, and $1(a)^{3}\Sigma^{+}$ States¹ CARL FAUST, JOSHUA JONES, SETH ASHMAN, CHRISTOPHER WOLFE, MARCELLUS PARKER, KARA RICHTER, BRETT MCGEEHAN, PEET HICK-MAN, JOHN HUENNEKENS, Lehigh University — We present experimental studies of the NaCs molecule that are currently underway in our laboratory. The opticaloptical double resonance method is used to obtain Doppler-free excitation spectra for several excited states. Selected data from the $5^{3}\Pi_{0}$ and $4^{3}\Pi_{0}$ electronic states are used to obtain Rydberg-Klein-Rees (RKR) and Inverse Perturbation Approach (IPA) potential curves. We have also mapped the repulsive wall of the $1(a)^{3}\Sigma^{+}$ potential using many resolved bound-free fluorescence spectra from individual rovibrational levels of the $5^3\Pi_0$ electronic state to the $1(a)^3\Sigma^+$ state. Using the determined $5^{3}\Pi_{0}$ state potential, we fit the repulsive wall of the $1(a)^{3}\Sigma^{+}$ state to reproduce the experimental spectra using LeRoy's BCONT program. A slightly modified version of BCONT is also used to fit the relative transition dipole moments, $\mu_e(R)$, as a function of internuclear separation R, for the various bound-free electronic transitions. We also present bound-free spectra and BCONT simulations for the nearby $4^3\Pi_0$ electronic state of NaCs.

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