RYDBERG STATES OF CALCIUM MONOCHLORIDE

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Experimental results from our continuing study of the Rydberg states of Calcium Monochloride will be presented. Previously we have characterized the quantum defects and predissociation mechanisms of core-penetrating $^2\Sigma^+$ states of CaCl in the n* = 3-7 region.[a,b] Questions unanswered by this work propelled further studies of the low-n* region (n* = 3-5) by REMPI and ion-dip techniques, as this region is expected to be extensively predissociated by $^2\Sigma^+$ and $^2\Pi$ repulsive states. Interest in high-n* (n* $>$ 15) Rydberg states of CaCl has also fueled further REMPI experiments near the first ionization threshold (48 491 cm^{-1}). Studies of the low-n* region failed to reveal several predicted members of known core-penetrating $^2\Sigma^+$ Rydberg series (n* = 0.16, 0.49, 0.68 $^2\Sigma^+$ and 0.30 $^2\Pi$), while preliminary data for the high-n* region above the $v^+ = 0$ IP indicate the presence of vibrationally autoionizing Rydberg states converging to $v^+ > 0$ vibrational levels of the $CaCl^+$ ion X $^1\Sigma^+$ state. Analysis is ongoing.

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[b]J. O. Clevenger, N. A. Harris, R. W. Field, J. Li, *J. Mol. Spec.* **193**, 412 (1999).