

Abstract Submitted  
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**Optical Spectroscopy of High- $L$  Rydberg States of Calcium<sup>1</sup>**

ALINA GEARBA, JEFFERSON SESLER, DANIEL MCILHENNY, RANDY KNIZE, JERRY SELL, United States Air Force Academy, BRETT DEPAOLA, Kansas State University, STEPHEN LUNDEEN, Colorado State University — The Resonant Excitation Stark Ionization Spectroscopy (RESIS) technique has been used to measure the details of the binding energies of a non-penetrating high- $L$  Rydberg electron bound to the  $\text{Ca}^+$  ion. A sample of high- $L$  Rydberg calcium atoms is formed by capture of a single electron from an  $n = 9$  rubidium Rydberg target by a fast beam of  $\text{Ca}^+$  ions. Individual fine-structure levels in the  $n = 10$  manifold of Ca are selectively detected using Doppler-tuned  $\text{CO}_2$  laser excitation to  $n = 26$ , followed by Stark ionization of the  $n = 26$  products. The Stark ionization rate is proportional to the population of the individual  $L$  level which is selectively excited by the  $\text{CO}_2$  laser and the positions of these lines are used to determine initial estimates of the dipole and quadrupole polarizabilities of the  $\text{Ca}^+$  ion.

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