

Abstract Submitted
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Observations of Multiple Bound-Bound Transitions in the Negative Ion of Lanthanum La^{-1} C.W. WALTER, N.D. GIBSON, D.J. MATYAS, C.T. CROCKER, K.A. DUNGAN, B.R. MATOLA, M.T. SCHARPF, Denison University, Granville, OH, J. ROHLÉN, University of Gothenburg, Sweden — The negative ion of lanthanum has been investigated with tunable infrared laser photodetachment spectroscopy. The relative signal of neutral atom production was measured with a crossed laser-ion beam apparatus over the photon energy range 0.29 – 0.77 eV. The spectrum reveals a number of sharp peaks due to bound-bound electric-dipole transitions in La^{-} , observed here through a two-step process of excitation followed by photodetachment of the upper state. The observed photodetachment spectrum is compared to theoretical calculations of energy levels and transition strengths by O'Malley and Beck [1]. The richness of the observed bound state spectrum is unprecedented for atomic negative ions, and it highlights the unique properties of La^{-} for applications such as laser cooling.

[1] S.M. O'Malley and D.R. Beck, *Phys. Rev. A* **79**, 012511 (2009); *Phys. Rev. A* **81**, 032503 (2010).

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C. Wesley Walter
Denison University

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