

Abstract Submitted
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A Promising Candidate for Laser Cooling of Negative Ions: Observations of Bound-Bound Transitions in La^{-1} C.W. WALTER, N.D. GIBSON, D.J. MATYAS, C.T. CROCKER, K.A. DUNGAN, B.R. MATOLA, Denison University, Granville, OH, J. ROHLÉN, University of Gothenburg, Sweden — The negative ion of lanthanum, La^{-} , has been previously proposed as perhaps the best candidate of any atomic anion for laser cooling based on theoretical analysis [1]. In the present experiments, transitions between bound states of La^{-} are investigated using tunable infrared photodetachment spectroscopy. The relative signal for neutral atom production was measured with a crossed ion-beam–laser-beam apparatus over the photon energy range 290–580 meV. The spectrum reveals at least ten sharp resonance peaks, some of which are interpreted as due to bound-bound electric dipole transitions in La^{-} observed through resonant two-photon detachment. 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* **81**, 032503 (2010).

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