

Abstract Submitted  
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**Bound and Quasibound States of the Negative Ion of Lanthanum ( $\text{La}^-$ ) Studied by Photodetachment Spectroscopy**<sup>1</sup> C.W. WALTER, N.D. GIBSON, N.B. LYMAN, J. WANG, Denison University, Granville, OH — The negative ion of lanthanum,  $\text{La}^-$ , has the richest bound state spectrum ever observed for an atomic negative ion [1], and it has been proposed as perhaps the best candidate for laser cooling of a negative ion [2,3]. In the present experiments,  $\text{La}^-$  is investigated using tunable infrared spectroscopy. The relative signal for neutral atom production was measured with a crossed ion-beam–laser-beam apparatus over the photon energy range 520-900 meV to probe the continuum region above the La neutral atom ground state. The spectrum shows multiple resonance peaks due to transitions to quasibound excited states of  $\text{La}^-$  which subsequently autodetach. In addition, photodetachment thresholds are observed to excited states of La. The measured spectrum is consistent with the recently reported revised electron affinity for lanthanum [4].

[1] C.W. Walter, N. D. Gibson, D. J. Matyas, C. Crocker, K. A. Dungan, B. R. Mattola, J. Rohlen, *Phys. Rev. Lett.* **113**, 063001 (2014); [2] S.M. OMalley and D.R. Beck, *Phys. Rev. A* **81**, 032503 (2010); [3] E. Jordan, G. Cerchiari, S. Fritzsche, A. Kellerbauer, *Phys. Rev. Lett.* **115**, 113001 (2015); [4] L. Pan and D.R. Beck, *Phys. Rev. A* **93**, 062501 (2016).

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