

Abstract Submitted  
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**Photodetachment Spectroscopy of  $\text{La}^-$ : Resonances and Thresholds**<sup>1</sup> C.W. WALTER, N.D. GIBSON, C. CROCKER, K.A. DUNGAN, B.R. MATOLA, 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]. In the present experiments, photodetachment thresholds and transitions between bound states of  $\text{La}^-$  are 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 290-900 meV. The spectrum reveals at least 14 sharp resonance peaks due to transitions to either bound states of the negative ion or quasibound states in the continuum. Multiple photodetachment thresholds are also observed, providing information on the binding energies for some states of  $\text{La}^-$ .

[1] C. W. Walter *et al.*, *Phys. Rev. Lett.* **113**, 063001 (2014) ; [2] S.M. O'Malley and D.R. Beck, *Phys. Rev. A* **81**, 032503 (2010).

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