

# Valence Calculations of Lanthanide and Actinide Anion Binding Energies

This document contains graphical representations of our most recent relativistic configuration-interaction calculations of lanthanide and actinide anion binding energies. Our comprehensive survey of the two rows predicts 118 bound anion states for the lanthanides, La ( $Z=57$ ) through Lu ( $Z=71$ ), and 41 states for the actinides, Ac ( $Z=89$ ) through Lr ( $Z=103$ ). No bound anion states are predicted for Yb, Fm, Md, or No. This pdf file is available online (along with a black and white version) at:

[www.phy.mtu.edu/~donald/research.html](http://www.phy.mtu.edu/~donald/research.html)

The anion data is taken from the following references:

- S. M. O'Malley and D. R. Beck, Phys. Rev. A **78**, 012510 (2008).
- S. M. O'Malley and D. R. Beck, Phys. Rev. A **79**, 012511 (2009).
- S. M. O'Malley and D. R. Beck, submitted to Phys. Rev. A (actinide work).

The neutral energies and  $LS$  designations are from the following:

*Atomic Energy Levels The Rare Earth Elements*, edited by W. C. Martin, R. Zalubas, and L. Hagan, Natl. Bur. Stand. Ref. Data Ser. Natl. Bur. Stand. (U.S.) Circ. No. 60 (U.S. GPO, Washington, DC, 1978).

*Energy Levels and Atomic Spectra of Actinides*, edited by J. Blaise and J.-F. Wyart, International Tables of Selected Constants **20**, Paris (1992).

NIST Atomic Spectra Database:

[physics.nist.gov/PhysRefData/ASD/](http://physics.nist.gov/PhysRefData/ASD/)

NIST Handbook of Basic Atomic Spectroscopic Data:

[physics.nist.gov/PhysRefData/Handbook/](http://physics.nist.gov/PhysRefData/Handbook/)

Neutral Lr excited  $^2D$  thresholds are from the following computational sources:

- A. Borschevsky, E. Eliav, M. J. Vilkas, Y. Ishikawa, and U. Kaldor, Eur. Phys. J. D **45**, 115 (2007).
- S. Fritzsche, C. Z. Dong, F. Koike, and A. Uvarov, Eur. Phys. J. D **45**, 107 (2007).
- Y. Zou and C. Froese Fischer, Phys. Rev. Lett. **88**, 183001 (2002).
- E. Eliav, U. Kaldor, and Y. Ishikawa, Phys. Rev. A **52**, 291 (1995).

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