

Abstract Submitted
for the DAMOP06 Meeting of
The American Physical Society

Improvements in the understanding of the spectrum and photodetachment of Ce^{-1} STEVEN M. O'MALLEY, DONALD R. BECK, Michigan Technological University — We have undertaken new relativistic configuration interaction calculations of the electron affinity of the $4f\ 5d^2\ 6s^2\ ^4\text{H}_{7/2}\ \text{Ce}^{-}$ ground state in an effort to resolve the differences among our earlier work² (428 meV), newer calculations³ (530 meV), and the much larger experimental value⁴ (955 meV). Inclusion of correlation involving the $4f$ electron brings us in good agreement with the other calculation³ (511 meV), but addition of core-valence effects that would further bind the system is prohibitively difficult: several eV of core-valence correlation disrupts the relative positioning of the valence correlation configurations, resulting in unacceptable (up to $\sim 30\%$) losses in their energy contributions. Thus, instead of opening the core, we have made a series of photodetachment cross section calculations. These results, along with a reinterpretation of the experimental data⁴, lead us to a new value for the Ce^{-} electron affinity of ~ 660 meV.

¹Supported by the National Science Foundation

²S. M. O'Malley and D. R. Beck, Phys. Rev. A **61**, 034501 (2000)

³X. Cao and M. Dolg, Phys. Rev. A **69**, 042508 (2004)

⁴V. T. Davis and J. S. Thompson, Phys. Rev. Lett. **88**, 073003 (2002)

Steven M. O'Malley
Michigan Technological University

Date submitted: 19 Jan 2006

Electronic form version 1.4