Lifetimes and branching ratios of excited anion states  

STEVEN M. O’MALLEY, DONALD R. BECK, Physics Department, Michigan Technological University — Relativistic configuration-interaction transition probability calculations have been performed for several anion cases of our recent lanthanide and actinide studies. In particular, we identified an E1 transition (∼3680 nm) in La− that may prove more useful in laser-cooling applications than the previously proposed Os− candidate. We also explored long-lived states in Lu− and Lr− which are restricted to M2 decay by selection rules. Finally, we found sufficient mixing between a weakly-bound alternate-configuration Pr− level and a nearby resonance to result in a lifetime (M1/E2) similar to other excited levels despite a two-electron difference between the dominant configurations. The details of the Pr− calculations serve as further confirmation of the utility of our universal restrictions on 4f^n and 5f^n portions of lanthanide and actinide wave functions, but we find that a similar application to d^k electron subgroups in transition metals (Os−) has a much smaller impact on the complexity of our calculations.

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