Abstract Submitted
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Lifetimes and branching ratios of excited anion states[1] 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[2] and actinide[3] 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[4]. 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 jls 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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[2]S. M. O'Malley and D. R. Beck, Phys. Rev. A **79**, 012511 (2009).
[3]S. M. O'Malley and D. R. Beck, Phys. Rev. A **80**, 032514 (2009).
[4]A. Kellerbauer and J. Walz, New J. Phys. **8**, 45 (2006).

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