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Photodetachment of Rb^-, Cs^-, and Fr^- within a new boundary-corrected Pauli equation approach[1] C. BAHRIM, Dept. of Physics, Kansas State University, Manhattan and Chemistry and Physics Dept., Lamar University, Beaumont, TX, I. I. FABRIKANT, Dept. of Physics and Astronomy, University of Nebraska, Lincoln, U. THUMM, Dept. of Physics, Kansas State University, Manhattan —

The Pauli equation (PE) is a weak relativistic limit of the exact Dirac equation which includes the spin-dependent potential V_{LS} added to the non-relativistic, spin-independent Coulomb potential V. For a Coulomb potential, V_{LS} includes a non-physical singularity $1/r^3$ at $r = 0$, and the PE-approach breaks down. Various regularization functions have been suggested to remove this singularity [1]. Based on the exact analytic solution of the Dirac equation near the nucleus, we formulated boundary conditions for solving the PE for an electron interacting with an atom [1]. By integrating the PE using an effective potential V_{eff} that is adjusted to reproduce scattering phase shifts provided by exact Dirac R-matrix calculations, we calculated angle-differential and total photodetachment (PD) cross sections. Our ${}^3P_1^o$ resonance contribution to the PD cross section of Cs^- agrees (in position and width) with recent experiments [2], after fine-tuning V_{eff}. [1] C. Bahrim, I.I. Fabrikant, and U. Thumm, Phys. Rev. Lett. **87**, 123003 (2001), and refs. therein. [2] M. Scheer et al., Phys. Rev. Lett. **80**, 684 (1998).

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