Abstract Submitted
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Relativistic many-body calculations of the energies of n=4 states for zinc-like ions WALTER JOHNSON, University of Notre Dame, STEVEN BLUNDELL, DRFMC/SPSMS CEA-Grenoble, ULYANA SAFRONOVA, University of Nevada, Reno — Energies of the 44 even-parity and 40 odd-parity ($4l4l'$) states of ions of the zinc isoelectronic sequence are evaluated through second order in relativistic many-body perturbation theory. Our calculations start from a Ni-like $V^{(N-2)}$ Dirac-Fock potential. Two alternative treatments of the Breit interaction are investigated. In the first version, we omit Breit contributions to the Dirac-Fock potential and evaluate Coulomb and Breit-Coulomb corrections through second order perturbatively. This version was used previously to evaluate energies Be-, B-, Mg-, Yb-like systems. In the second version, we include both Coulomb and Breit contributions to the Dirac-Fock potential and then treat the residual Breit and Coulomb interactions perturbatively. Results obtained from the two versions are compared and discussed. Theoretical excitation energies are compared with critically evaluated experimental data and with results from other recent calculations. Trends of excitation energies including splitting of triplet terms as functions of nuclear charge $Z = 34$–100 are illustrated graphically for some states. The resulting Z-dependence shows explicitly the effect of mixing $[4p^2 + 4s4d]$, $[4d^2 + 4p4df]$, and $[4p4d + 4s4f]$ configurations.

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