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Relativistic many-body calculations of energies in a broad range of Lu-like ions from W^{3+} to Fm^{29+} U.I. SAFRONOVA, A.S. SAFRONOVA, University of Nevada, Reno — Energies of the [Xe]$4f^{14}5d^3$, [Xe]$4f^{14}5d^26s$, [Xe]$4f^{14}5d^26p$, and [Xe]$4f^{14}5d6s6p$ states of lutetiumlike ions with Z = 74-100 are determined using second-order relativistic many-body perturbation theory (RMBPT). Our calculations start from a Er-like Dirac-Fock potential ([Xe]$4f^{14}$ where [Xe]=$1s^22s^22p^63s^23p^63d^{10}4s^24p^64d^{10}5s^25p^6$). Second-order Coulomb and Breit-Coulomb interactions are included. Correction for the frequency-dependence of the Breit interaction as well as Lamb shift correction to energies are taken into account in lowest order. The three-electron contributions to the energy are compared with the one- and two-electron contributions. They are found to contribute about 10-20% of the total second-order energy. The ratio of the third-order and second-order corrections to the one-electron contributions is found to be about 5-10%. A detailed discussion of the various contributions to the energy levels is given for Lu-like tungsten (Z=74). Trends of excitation energies including splitting of the doublet and quartet terms as functions of nuclear charge Z = 71–100 are illustrated graphically for some states. This research was sponsored by DOE under the OFES grant DE-FG02-08ER54951.

Ulyana Safronova
University of Nevada, Reno

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