

Abstract Submitted
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Relativistic many-body calculation of energies, oscillator strengths, transition rates, lifetimes, multipole polarizabilities, and hyperfine constants of Th IV ion¹ MARIANNA SAFRONOVA, University of Delaware, ULYANA SAFRONOVA, University of Nevada, Reno — Atomic properties of the 24 low-lying ns , np_j , nd_j , nf_j , and ng_j states in Th IV ion are calculated using the high-precision relativistic all-order method where all single, double, and partial triple excitations of the Dirac-Fock wave functions are included to all orders of perturbation theory. Recommended values are provided for a large number of electric-dipole matrix elements, oscillator strengths, transition rates, and lifetimes. Scalar polarizabilities of the ground and six excited states ($5f_j$, $6d_j$, $7p_j$, and $7s$ states), and tensor polarizabilities of the $5f_j$, $6d_j$, and $7p_{3/2}$ states are evaluated. The uncertainties of the recommended values are estimated. The hyperfine structure of the ^{229}Th IV ion is investigated. The hyperfine A - and B -values are determined for the low-lying levels listed above. These calculations provide recommended values critically evaluated for their accuracy for a number of Th IV atomic properties for use in theoretical modeling as well as in planning and analysis of various experiments including RESIS studies of actinide ions and development of ultraprecise nuclear clock.

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