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Relativistic calculations of Ba^+ atomic properties EUGENIYA ISKRENOVA-TCHOUKOVA, MARIANNA S. SAFRONOVA, Department of Physics and Astronomy, University of Delaware, Newark, DE 19716 — The interest in calculating the energy levels and transition rates of Ba^+ ion is motivated by the possibility to study the parity non-conservation (PNC) with a single trapped ion. The study of PNC in heavy atoms provides atomic-physics tests of the Standard Model and allows to measure nuclear anapole moment. There is an ongoing theoretical and experimental effort for precise calculations and measurements of the PNC transition amplitudes. We compute the energy levels and transition amplitudes of Ba^+ ion using the relativistic all-order method. The lifetimes of several excited states are calculated and the results are found to be in good agreement with the experimental values. The static electric-dipole and electric-quadrupole polarizabilities of the Ba^+ ion in its ground state are calculated and compared with recent experimental values. We investigate the significant disagreement between the theoretical and experimental values of the ground state quadrupole polarizability. A consistency study of the lifetime and polarizability measurements in Ba^+ is conducted.

Eugeniya Iskrenova-Tchoukova
Department of Physics and Astronomy
University of Delaware, Newark, DE 19716

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