Two-electron vacuum-polarization corrections to the hyperfine splitting in Li-like bismuth

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Investigations of the hyperfine splitting (HFS) in highly charged ions can provide tests of quantum electrodynamics (QED) in the strongest electromagnetic field presently available. The simultaneous study of the HFS in H- and Li-like ions is required, since the Bohr-Weisskopf effect, dominating the theoretical uncertainty, is almost cancelled in the specific difference of the HFS values [1]. *Ab-initio* calculations of the screened QED corrections are needed to decrease the uncertainty of the theoretical prediction for this specific difference. Recently, the HFS in Li-like bismuth was observed in laser spectroscopy experiment at the experimental storage ring (ESR) in GSI.

In the present work the results [2,3] for the two-electron vacuum-polarization corrections to the HFS in Li-like bismuth are improved. The screened diagrams containing electric and magnetic vacuum-polarization loops have been evaluated to all orders in αZ [4,5]. The internal-loop contributions are rigorously approached including the Uehling and the Wichmann-Kroll terms. The uncertainty of the theoretical prediction for the specific difference of the hyperfine splitting values in H- and Li-like bismuth is reduced.

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