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Bohr-Weisskopf effect in the thallium atom

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One of the quantities measured with high precision in heavy atoms (and low-atomic molecules) is the hyperfine splitting constant. For the most accurate theoretical prediction of this splitting one has to take into account nuclear structure contributions. These are contributions from the distribution of the charge (Breit-Rosental effect) [1, 2] and magnetization (Bohr-Weisskopf effect) [3, 4] over the nucleus. We show that these effects can be taken into account using the Gaussian basis set for electronic structure calculations.
In addition, a study was made of the hyperfine magnetic anomaly –a special combination of hyperfine constants and g-factors of 2 different isotopes, sufficiently sensitive to differences in the distribution of magnetization. As is known, the ratio of anomalies for two different electronic states is stable with respect to the choice of the nuclear model and its parameters. This fact is employed to predict the magnetic moments of short-lived isotopes. The obtained values are in a good agreement with the previously obtained estimates.
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