

Zeeman splitting in lithium-like and boron-like ions

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The g factor of hydrogen-like ions proved to be a sensitive tool for determination of fundamental constants [1]. First ppb-precision measurement for lithium-like system has been accomplished recently [2]. Experiments with heavy boron-like ions can provide independent determination of the fine structure constant [3]. The ARTEMIS experiment presently being performed at GSI aims at measurement of the Zeeman splitting in boron-like argon [4]. Apart from the g factors of the ground and first excited states, it will be sensitive to the non-linear effects in magnetic field.

We present the most recent theoretical results for the g factor of medium- Z lithium-like and boron-like ions and for the contributions of second and third order in magnetic field to the Zeeman splitting in boron-like ions. The g factor of lithium-like ions is improved by the rigorous evaluation of the screened-QED and two-photon-exchange corrections. The g factor of boron-like ions includes the first-order QED corrections, the one-photon exchange, the higher-order correlation effects in the Breit approximation, and the recoil correction.

References

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