Nuclear and QED corrections to the *g* factor of hydrogenic ions

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We present theoretical results of two recent projects related to a bound-electron *g* factor. Firstly, we show theoretical predictions for the nuclear-deformation effect on the bound-electron *g* factor in the range of nuclear charge numbers from *Z=6* up to *Z=92*. The correction becomes significant for mid-*Z* ions and for very heavy elements it even reaches the 10^{-6} level [1], therefore, it definitely will be important for the comparison between theory and experiment for high-*Z* elements, which is expected within a few years. These results are likely to allow in future for the extraction of nuclear deformation parameters from experimental values of the *g* factor.

The second project [2] is related to a measurement of $g(^{12}C^{5+})$. Not only is this project expected to allow for the determination of the electron's mass with a relative uncertainty significantly lower than an uncertainty of the established value, but it shall also constitute a more stringent test of bound-state QED by means of comparison with the previous value of the electron's mass. In order to reduce an error bar on the theory's side, we have, first of all, estimated the unknown two-loop higher-order correction to $g(^{12}C^{5+})$, which is the main source of the uncertainty, by extracting this effect from experimental results for $g(^{28}Si^{13+})$. In addition, we have improved on the accuracy of certain other physical terms contributing to the *g* factor.

References:
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