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Nuclear and QED corrections to the bound-electron g factor JACEK ZATORSKI, NATALIA S. ORESHKINA, CHRISTOPH H. KEITEL, ZOLTÁN HARMAN, Max Planck Institute for Nuclear Physics, Saupfercheckweg 1, 69117 Heidelberg, Germany — We calculate nuclear shape and quantum electrodynamic corrections to the g factor of a bound electron [1,2]. These theoretical studies are motivated by the current improvement of experimental possibilities: on the one hand, in a recent Penning trap measurement [2], the g factor of $^{28}Si^{13+}$ has been determined with an unprecedented $5 \cdot 10^{-10}$ relative uncertainty. A novel experimental technique will further improve accuracy to the 10^{-11} level. On the other hand, experiments with ions as heavy as $^{238}U^{91+}$ will be performed soon at the HITRAP-FAIR facility. For such heavy ions, nuclear effects play an important role. The leading relativistic nuclear deformation correction has been derived analytically and also its influence on one-loop quantum electrodynamic terms has been evaluated. We present results for medium- and high-Z hydrogenlike ions, which become significant already for mid-Z ions, and for very heavy elements it even reaches the 10^{-6} level, as we show in [1].

[1] J. Zatorski, N. S. Oreshkina, C. H. Keitel, and Z. Harman, Phys. Rev. Lett., in press; arXiv:1110.3330
[2] S. Sturm, A. Wagner, B. Schabinger, J. Zatorski, *et al.*, Phys. Rev. Lett. **107**, 023002 (2011).

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