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Bound-electron g-factor and fundamental constants

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High-precision measurements of the g-factor of highly charged ions are among the physics topics of the FLAIR collaboration within the framework of FAIR. Simultaneous experimental and theoretical study of the g-factor of light hydrogen-like ions provided the best up-to-date determination of the electron mass [1]. First ppb-precision measurement for lithium-like system has been accomplished recently [2]. Experiments with heavy boron-like ions will lead to independent determination of the fine structure constant [3]. As an indispensable step towards this goal, the g-factor of boron-like argon is to be measured within the ARTEMIS experiment at GSI [4]. The correspondingly high accuracy of the theoretical values requires complex calculations within the framework of bound-state QED. The most recent results obtained by our group demonstrate perfect agreement between the theory and experiment at the level of 10^{-8} [5]. Presented are the recent developments on both experimental and theoretical sides as well as the plans for future.

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- [5] A.V. Volotka et al., Phys. Rev. Lett., accepted for publication.

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