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Bound Electron g Factor Measurements of Highly Charged Tin

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Highly charged ions are a great platform to test fundamental physics in strong electric fields. The field-strength experienced by a single electron bound to a high Z nucleus reaches strengths exceeding 10¹⁸V/m. Perturbed by the strong field, the g factor of a bound electron is a sensitive tool that can be both calculated and measured to high accuracy. In the recent past, g factor measurements of low Z ions reached precisions below 5·10⁻¹¹ [1, 2]. Following this route, the ALPHATRAP Penning trap setup is dedicated to precisely measure bound-electron g-factors of the heaviest highly charged ions [3].
In this contribution, our recent measurement of bound-electron g factors in highly charged tin will be presented. Over the course of multiple months, g factors for three different charge states have been measured, each allowing a unique test of QED in a heavy highly charged ion, probing different g factor contributions. Furthermore, progress on a new EBIT setup is presented. This will eventually allow ALPHATRAP to inject and measure even heavier highly charged systems beyond hydrogenlike lead (Pb⁸¹⁺) in our Penning-trap apparatus.

References

1) S. Sturm et al, Nature 506, 467–470 (2014)
2) S. Sturm et al, PRA 87, 030501(R) (2013)
3) S. Sturm et al, EPJ 227, 1425–1491 (2019)

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