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Towards g -factor measurements of (anti-)protons using techniques based on quantum logic spectroscopy

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High-precision matter-antimatter comparisons allow to test CPT symmetry and to search for new physics beyond the standard model. The BASE collaboration contributes to these tests by measuring the charge-to-mass ratio and g -factor of protons and antiprotons in cryogenic Penning traps [1-3]. The BASE experiment at the Leibniz University Hannover is developing measurement schemes based on sympathetic cooling and quantum logic spectroscopy to further increase sampling rates, using $^9\text{Be}^+$ both as cooling and logic ion [4].

This contribution will present recent advances, including adiabatic transport in the ms-regime [5] and ground-state cooling of a single $^9\text{Be}^+$ ion [6]. Furthermore, upcoming changes to the experimental apparatus, including a redesigned Penning trap stack, will be shown.

- [1] G. Schneider et al., Science 358, 1081 (2017)
- [2] C. Smorra et al., Nature 550, 371 (2017)
- [3] M.J. Borchert et al., Nature 601, 53 (2022)
- [4] Juan M Cornejo et al 2021 New J. Phys. 23 073045
- [5] Meiners et al., arXiv:2309.06776 (2023)
- [6] Cornejo et al., arXiv:2310.18262 (2023)

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