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The ARTEMIS Experiment for Precision Measurements of Electron Magnetic Moments in Heavy Highly Charged Ions

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The ARTEMIS experiment at the HITRAP facility situated at GSI, Darmstadt, focuses on precision spectroscopy of highly charged ions as a benchmark of QED in extreme fields. Electron magnetic moments (g-factor) will be determined using the laser-microwave double-resonance spectroscopy on the desired few-electron ions stored in the trap. Laser-microwave double-resonance spectroscopy enables microwave probing of the Larmor frequency through laser spectroscopy of fine/hyper-fine structure of the ions. The induced Zeeman transition is determined through a difference in intensity of the fluorescence produced in a closed optical cycle. Ions are currently produced within the cryogenic Penning trap[1] and are stored, prepared and cooled using electronic, non-destructive techniques[2].

The experimental setup is connected to the low energy HITRAP beamline thereby facilitating online/offline beam delivery, dynamic capture and injection into the trap. Upgrades are ongoing to perform g-factor measurements on hydrogen-like heavy species such as Bi82+ and other lighter species such as S11+. We present an overview along with the current status of the experiment.

References:

- [1] Kanika et al., J. Phys. B 56, 175001 (2023)
- [2] Ebrahimi et al., Phys. Rev. A 98, 023423 (2018)

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