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# Precision measurement of electron g-factor in highly charged ions at ARTEMIS

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The ARTEMIS (AsymmetRic Trap for the measurement of Electron Magnetic moment in IonS) [1] experiment at the HITRAP facility in GSI, Darmstadt, aims to measure magnetic moment of the electron bound to highly charged ions using the laser-microwave double-resonance spectroscopy [2] technique. The ARTEMIS Penning trap consists of two parts, the creation part of the trap which allows for *in-situ* production of the ions and the capture of ions, when connected to an external ion source, and the spectroscopy part of the trap where the measurements are performed. In the spectroscopy trap, laser-microwave double-resonance technique will be used to determine the electron's Larmor frequency, where a Zeeman transition is induced by microwave radiation, and the success of the transition is determined by the corresponding drop in the fluorescence light generated by a closed optical cycle transition. Ion clouds with $10^3$ to $10^4$ ions are stored and cooled in the Penning trap [3]. These large ion clouds are stored up to several weeks due to the high vacuum of about $10^{-15}$ mbar in the trap at cryogenic temperatures of 4 K. Due to the presence of electric and magnetic fields, the ions oscillate in the axial direction with frequency $_z$, the radial motion has a reduced cyclotron frequency $_+$ and the drift motion with frequency $_-$. These oscillating charges induce image currents on the electrodes, which are detected non-destructively using resonators. Currently, ARTEMIS is working toward a commissioning measurement of $Ar^{13+}$ using ions created directly inside the trap chamber. Work is also underway to prepare the experiment for capture of heavy, HCIs from HITRAP such as $Pb81+$ and $Bi^{82+}$.

**References**

1) W. Quint et al., Phys. Rev. A 78, 032517 (2008)
2) D. Lindenfels et al., Phys. Rev. A 87 023412 (2013)
3) M. S. Ebrahimi et al., Phys. Rev. A 98 023423 (2018)

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