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## Study of Highly Charged Ions for the Test of Bound-State QED

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The high-precision measurement of the Zeeman splitting of fine and hyper fine-structure levels can be measured using spectroscopy techniques. The Penning trap ARTEMIS at the HITRAP facility at GSI utilises such a method called Laser-Microwave double-resonance spectroscopy to measure the magnetic moment and to test bound-state QED calculations by the  $g$ -factor measurements of heavy, highly-charged ions like  $\text{Ar}^{13+}$  and  $\text{Bi}^{82+}$ . After cooling the stored ion cloud in the trap by resistive cooling, non-destructive detection technique is used to detect the presence of ions. Different ions in the trap are resolved according to their charge-to-mass ratio by fixing the frequency and ramping over a range of voltages. By using Stored Waveform Inverse Fourier Transform (SWIFT) method,  $\text{Ar}^{13+}$  ions are isolated from the ion cloud for the  $g$ -factor measurements. Studies are also done to determine the phase transition of dense ion cloud due to the discontinuous behaviour of spectral features during cooling.

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