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## The ALPHATRAP $g$ -Factor Experiment

The ALPHATRAP experiment is a Penning-trap setup dedicated to test bound-state quantum electrodynamics by determining the  $g$ -factor of the bound electron in the electric field of highly charged ions (HCI) with ultra-high precision.

The ALPHATRAP experiment is currently in the final stage of commissioning.

The setup exists of a cryogenic double Penning-trap tower in which the HCI can be stored and manipulated for  $g$ -factor measurements.

For the production of ions, the setup incorporates an external non-cryogenic compact room temperature Electron Beam Ion Trap (EBIT) for creation of HCI from injected gas, e.g.  $^{40}\text{Ar}^{15+}$  or  $^{129}\text{Xe}^{25+}$  and a laser ionization source, used for producing singly charged beryllium ions.

A beamline connecting the Heidelberg-EBIT, able to produce HCI up to hydrogen-like  $^{208}\text{Pb}^{81+}$ , is currently under construction.

In addition to extending measurements of the  $g$ -factor of the bound electron into the regime of heavy HCI, a setup for sympathetic laser cooling of the HCI via directly Doppler laser cooled  $^9\text{Be}^+$  ions is currently set up.

With this setup lower ion temperatures could be achieved which is expected to increase the precision of the measurements and reduce unwanted systematic shifts.

An overview and the current status of the project will be presented.

### Summary

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