

The ALPHATRAP g -Factor Experiment

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ALPHATRAP is a high-precision Penning-trap based experiment dedicated to the exploration of ground-state properties of heavy, highly charged ions (HCI). The major goal of ALPHATRAP is the measurement of the bound-electron gyromagnetic factor, or g -factor, which can be predicted to very high precision in the framework of bound-state quantum electrodynamics (BS-QED). The comparison of the experimental results with recent theoretical calculations will not only serve as a sensitive test of BS-QED, but also yields a new approach for the determination of fundamental constants such as the electron mass or the fine structure constant α .

The measurement of the bound-electron g -factor of a single HCI is performed in an improved cryogenic double Penning-trap setup, utilizing the continuous Stern-Gerlach effect. For injection of externally produced HCI up to $^{208}\text{Pb}^{81+}$ the ALPHATRAP experiment is coupled to various ion-sources, including the Heidelberg Electron-Beam Ion Trap. The ALPHATRAP apparatus including beamline, trap tower and electronics was successfully commissioned with single $^{12}\text{C}^{5+}$ and $^{40}\text{Ar}^{13+}$ ions, and is in preparation for its first g -factor measurement. This poster will give an overview of the experimental setup.