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**The ALPHATRAP *g*-Factor Experiment** IOANNA ARAPOGLOU, ALEXANDER EGL, MARTIN HOCKER, SANDRO KRAEMER, TIM SAILER, ANDREAS WEIGEL, J. R. CRESPO LOPEZ-URRUTIA, ROBERT WOLF, SVEN STURM, KLAUS BLAUM, Max Planck Institute for Nuclear Physics, Heidelberg, Germany — ALPHATRAP is a high-precision Penning-trap experiment that aims for the most stringent test of bound-state quantum electrodynamics (BS-QED) in the strong field regime. These fields are provided by heavy highly-charged ions (HCI), such as hydrogen-like $^{208}Pb^{81+}$, where the electron is exposed to the strong binding potential of the nucleus. The storage and manipulation of the ions is achieved using a double Penning-trap system in which the electron's $g$-factor is deduced from measuring its magnetic moment. The setup includes several ion creation possibilities for offline ion production, additional to the online injection of heavy HCI from the Heidelberg Electron Beam Ion Trap. This will deliver the heavy HCI via an ion beam-line, to the cryogenic double Penning-trap system. The latter consists of the so called Precision Trap for high-precision measurements of the ion cyclotron frequency in a homogeneous magnetic field, and the Analysis Trap for spin state detection of the bound electron in a magnetic bottle configuration. This experimental setup not only enables high-precision tests of BS-QED, but also allows the determination of fundamental constants, such as the fine structure constant $\alpha$ and the atomic mass of the electron $m_e$, to competitive precision.

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