

# Stuttgarter Physikalisches Kolloquium

Fachbereich Physik, Universität Stuttgart  
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## Zum 100-jährigen Stern-Gerlach Jubiläum

**The Stern-Gerlach Experiment: a Milestone in Physics History & Stern-Gerlach today: ultra-precision measurements of natural constants and compelling comparisons of matter and antimatter**

**Klaus Blaum**, *Max-Planck-Institut für Kernphysik, Heidelberg*  
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## Abstract

In the night from February 7th to the 8th in 1922 Gerlach and Stern succeeded for the first time ever in measuring the magnetic moment of atoms. This experiment provided evidence that Sommerfelds and Debyes postulate of "Richtungsquantelung" (Space quantization) of magnetic moments in external magnetic fields was correct. The historic trail of unraveling the mystery of the Zeeman effect and the concept as well as experimental challenge of the Stern-Gerlach experiment are described. Furthermore its scientific finds and the impact on science and technology are discussed. Finally Sterns and Gerlach Nobel Prize history is presented.

An overview is given on recent mass and g-factor measurements with extreme precision on single or few cooled ions stored in Penning traps. On the one hand, mass measurements provide crucial information for atomic, nuclear and neutrino physics as well as for testing fundamental interactions and their symmetries. On the other hand, g-factor measurements of the bound electron in highly charged hydrogen-like ions allow for the determination of fundamental constants and for constraining Quantum Electrodynamics. For example, the most stringent test of CPT symmetry in the baryonic sector could be performed by mass comparison of the antiproton with H- and the knowledge of the electron atomic mass could be improved by a factor of 13.