

Plenary Talk

PV IX Thu 9:45 E415

Exploring fundamental interactions and constants with trapped ions — ●SVEN STURM — Max Planck Institute for Nuclear Physics (MPIK), Heidelberg

Single ions in cryogenic Penning traps are almost ideal tools for exploring the validity of quantum electrodynamics (QED) as well as for determining the values of fundamental constants - the links that allow us to compare theories to actual measurements. We utilise the extraordinary control over the motion of the trapped ions, which are decoupled from any disturbing environment, to determine their mass, magnetic mo-

ment (g-factor) and transition spectrum with highest precision. This way, we have measured the masses of electron, proton, deuteron and helium. Furthermore, with highly charged ions we can explore the strongest electromagnetic fields and perform stringent tests of strong-field QED. Novel techniques have lately enabled a leap in precision, so that the comparison of experiment and theory allows searching for new physics beyond the Standard Model. Finally, the Penning-trap toolbox enables laser spectroscopy of otherwise difficult-to-access species, such as the molecular hydrogen ion. I will present the techniques as well as our previous and future campaigns.