

SYWS 1: Fundamental Interactions and their Symmetries I

Zeit: Mittwoch 14:00–15:30

Raum: 1A/B/C

Hauptvortrag SYWS 1.1 Mi 14:00 1A/B/C
Electric dipole moments: theory and experiment — ●E.A. HINDS — Centre for Cold Matter, Imperial College London

New elementary particle physics (beyond the standard model) is needed at the 1 TeV energy scale to understand the origin of mass and to explain why we see more matter than antimatter in the universe. This same new physics is expected to give permanent electric dipole moments to elementary particles. Thus the search for electron and neutron EDMs is the search for new particle physics. I will discuss the status and prospects of these searches and their implications for elementary particle theory.

Hauptvortrag SYWS 1.2 Mi 14:30 1A/B/C
Improved Tests of Lorentz and CPT Symmetry using Noble-Gas Masers — ●RONALD WALSWORTH — Harvard University

I will discuss recent improvements of the $^{129}\text{Xe}/^3\text{He}$ Zeeman maser used to make measurements constraining Lorentz and CPT violation. Experimental investigations of Lorentz and CPT symmetry provide important tests of the framework of the Standard Model of particle

physics and theories of gravity. Our previous measurements with the $^{129}\text{Xe}/^3\text{He}$ Zeeman maser set stringent limits on rotation- and boost-dependent Lorentz and CPT violation involving the neutron, consistent with no effect at the level of 10^{-31} GeV and 10^{-27} GeV, respectively. Recent upgrades to the system should lead to an order-of-magnitude improvement in sensitivity to Lorentz and CPT violation.

Hauptvortrag SYWS 1.3 Mi 15:00 1A/B/C
Precision measurements with cold neutrons — ●TORSTEN SOLDNER — Institut Laue Langevin, Grenoble, France

Cold neutrons provide several ways to investigate fundamental symmetries and interactions and to search for “new physics”: Right-handed contributions to weak interaction or time reversal violation beyond the Standard Model can be searched for by precision measurements of correlations between neutron decay products. The neutron’s electric dipole moment is a very sensitive probe for new sources of time reversal violation. Measurements of asymmetries in reactions of polarised neutrons with light nuclei provide information on the weak contributions to nucleon-nucleon processes. I will present related experiments that have been carried out at the Institut Laue Langevin.