



CRC 1227
Designed Quantum States of Matter



GUEST LECTURE

Prof. Dr. Peter Fierlinger

TUM School of natural Sciences,
Technical University of Munich, Germany

Leibniz Universität Hannover

DQ-mat Lecture

Thursday, 23 January 2025, 10.00 - 12.00 am

Room D326, Welfengarten 1, Building 1101

"Electric Dipole Moments"

The search for Electric Dipole Moments (EDMs) of fundamental systems is ongoing since the 1950's: an EDM would be a manifestation of physics at very high energy scales, and would violate P and T symmetry. It has significant impact on our understanding of the early Universe, in particular the origin of matter-antimatter asymmetry. Key for measurements was the invention of Ramsey's method of separated oscillating fields. It enabled unprecedented experimental sensitivities, e.g. 10^{-44} J energy resolution in an experiment using the isotope ^{129}Xe . Many different systems like nucleons, atoms or leptons are experimentally accessible and complementary in their physics reach. Through relating results from different experiments using effective field theory with each other and also to measurements at higher energy, EDM searches are among the most powerful tools in particle physics. An overview of the field with current status of joint analyses, as well as a selection of particularly interesting experimental strategies, approaches and techniques with emphasis on future potential will be discussed. Direct spin-offs are e.g. searches for ultra-light (axion) Dark Matter, but also applications in biomagnetic sensing, as magnetic field measurements are a key technical aspect for most EDM searches.

All DQ-mat members and all interested are cordially invited to attend.