PHYSIKALISCHES KOLLOQUIUM

Sommersemester 2026

Das Kolloquium findet (soweit nicht anders angegeben) **jeweils montags um 14:15 Uhr im Röntgen-Hörsaal** des Physikalischen Instituts, Hubland Campus Süd, Universität Würzburg **und online via Zoom statt**.
Zugangsdaten siehe https://www.physik.uni-wuerzburg.de/aktuelles/veranstaltungen-aus-der-physik/physikalisches-kolloquium/

22.06.2026

Antrittsvorlesung Professur für Festkörperphysik

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Magnetism at the atomic scale

Abstract

Magnetism lies at the heart of many of today's most transformative technologies, from information storage to the rapidly evolving field of quantum computing. As we push toward ever smaller, faster, and more energy-efficient devices, a fundamental question emerges: how can magnetic phenomena be understood, controlled, and ultimately designed at the level of single atoms?

In this lecture, I will explore how scanning tunnelling microscopy (STM) provides a powerful platform to address this challenge. By enabling the imaging, manipulation, and spectroscopic investigation of individual atoms and molecules, STM allows us to construct and probe magnetic systems with unprecedented precision. Combined with advanced techniques such as pump–probe methods, stochastic resonance, and electron spin resonance spectroscopy, it opens the door to accessing magnetic dynamics and interactions across a wide range of energy and time scales.

A central theme of this work is the controlled creation of emergent quantum states. Magnetic centres on superconductors, for instance, give rise to bound states within the superconducting gap with remarkable properties. These states offer a route toward engineering topological phases that are highly relevant for fault-tolerant quantum computing.

Looking forward, the key challenge is to move from observation to control. One direction we pursue is to harness the coupling of these states to electromagnetic fields in order to tune their properties and dynamics at the atomic scale. A complementary and technologically motivated approach is to exploit electric fields as a means of control: unlike magnetic fields, they can be generated, localized, and integrated with relative ease. Establishing electric-field control of magnetism at the atomic scale thus represents an important step toward translating fundamental insights into functional quantum devices.

Für die Dozentinnen bzw. Dozenten der Fakultät

Prof. Dr. Neuenfeld, Dr. Feichtner, Dr. Ünzelmann, Hr. Plote, Hr Schwarzkopf