



ANNOUNCEMENT - TALK

Title: Tuning Quantum Materials

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Abstract

Quantum materials, which often exhibit collective orders such as antiferromagnetism, charge-density waves, or superconductivity, tend to react sensitively to small changes of external parameters, including temperature, magnetic field, composition, or lattice parameters. The use of such parameters thus permits control and tuning of the materials' properties. I will first discuss examples of strain acting as a control parameter and probe for physical properties in materials such as CsFe_2As_2 or $\text{Ca}_{1-x}\text{Sr}_x\text{Co}_2\text{As}_2$. We investigate both thermal strains and the effect of externally applied strains using thermal-expansion and elastoresistance measurements. Second, I will discuss chemical tuning. The close integration of single-crystal synthesis techniques with transport and thermodynamic methods permits us to identify the consequences of small chemical variations. For example, I will show how the charge-density-wave transition in NbSe_2 is modified when crystal-growth conditions vary.

Research

We deal with materials whose properties are determined to a large extent by quantum mechanical effects, so-called quantum materials. Often these materials show strong correlations between the approx. 10^{23} electrons in a sample and have properties that are not yet known or understood. Among them are fascinating effects such as magnetism or superconductivity, which we investigate with various experimental methods.

Our goal is to understand the interaction of the correlated phases of a material with each other, with the crystal lattice and with the environment. Some research topics are properties of unconventional superconductors, the interplay of different ordered phases in correlated materials and the targeted manipulation of magnetic orders.

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Location:	MPSD 900.EG.136
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