TECHNISCHE UNIVERSITÄT DRESDEN

IFMP Institut für Festkörper- & Materialphysik

IFMP Seminar

Date: Tuesday, June 01, 2021, at 14:50

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Speaker: **Shreenanda Ghosh**

Technische Universität Dresden

Title: **Manipulation of time-reversal-breaking superconductivity in Sr_2RuO_4 by uniaxial stress**

Abstract: Although the normal-state electronic structure of Sr_2RuO_4 is known with exceptional precision, even after two decades of research the symmetry of its certainly unconventional superconducting state is under strong debate, e.g. the long-favoured spin-triplet $p_x \pm ip_y$ state is ruled out by recent NMR experiments [1]. However, in general time-reversal symmetry breaking (TRSB) superconductivity indicates complex two-component order parameters. Probing Sr_2RuO_4 under uniaxial stress offers the possibility to lift the degeneracy between such components [2]. One key prediction for Sr_2RuO_4, a splitting of the superconducting and TRSB transitions under uniaxial stress, has not been observed so far. I will show results of muon spin relaxation (μSR) measurements on Sr_2RuO_4 placed under uniaxial stress, wherein a large stress-induced splitting between the onset temperatures of superconductivity and TRSB was observed [3]. Moreover, at high stress beyond the van Hove singularity, a new spin-density-wave-ordered phase was detected for the first time. In order to perform μSR measurements under uniaxial stress, a custom piezoelectric-based pressure cell was developed [4]. This cell is going to be useful for a range of other materials in which the Fermi surface or magnetic interaction strengths can be tuned, leading to strong modifications of the electronic state.

[1] A. Pustogow, *et al.*, Nature **574**, 72 (2019); K. Ishida *et al.*, J. Phys. Soc. Jpn. **89**, 034712 (2020).
[2] C. Hicks, *et al.*, Science **344**, 283 (2014).
[3] V. Grinenko*, S. Ghosh* *et al.*, Nature Physics, DOI: 10.1038/s41567-021-01182-7 (2021).
[4] S. Ghosh *et al.*, Review of Scientific Instruments **91**, 103902 (2020).

Host: H.-H. Klauß