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Synthesis, theoretical examination and experimental investigation of emergent iron-based superconductors

Initiative: Trilaterale Partnerschaften – Kooperationsvorhaben zwischen Wissenschaftler(inne)n aus der

Ukraine, Russland und Deutschland

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The project will address the most emergent topics of iron pnictides and chalcogenides (FeSCs). It is planned to synthesize new crystals not studied so far and to study their unique physical properties. In particular, it is intended to continue the search for novel for metals charge collective excitations (indirect excitons) in related sister systems of KFe2As2, to investigate the superconducting order parameter and magnetism in these systems. The phase diagrams of Ba1-xAxFe2As2 (A=K,Cs,Rb), KFe2As2-CsFe2As2, NaFe2As2-RbFe2As2, KFe2As2-KFe2P2 and RbxFe2-ySe2-zSz substitution series will be investigated. By means of point contact spectroscopy in the normal state the compounds AFe2As2 with small Ba doping will be studied to identify the charge collective excitations which were discovered in KFe2As2. Using point contact Andreev reflections spectroscopy and the analog of the non-stationary Josephson Effect for point contacts (Shapiro steps), the change of the superconducting order parameter from s- to d- wave symmetries and the predicted intermediate s+id superconducting phase with time reversal broken symmetry will be searched for. In addition, the recently discovered C4- phase in alkali-doped BaFe2As2 will be investigated by means of Mössbauer and point contact spectroscopies. The expected experimental data will be analyzed within different theoretical model and approaches. This study will allow to make a significant step in understanding the triggering of the mechanism of superconductivity in unconventional Fe-SC.

Projektbeteiligte

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