"Superconductivity and antiferromagnetic correlations in Fe-based superconductors"

Prof. Vladimir Tsurkan, University of Augsburg

In the first part of the talk a general introduction into the physical phenomena in several groups of novel Fe-based pnictide and chalgogenide superconductors will be given. The peculiarities of their crystal structure, magnetic and charge transport will be described.

The second part will be devoted to Rb-intercalated FeSe compounds. These compounds show fascinating coexistence of superconductivity and antiferromagnetic order (Fig.1). The details of growth of the single crystals will be described with relation to flux and Bridgman methods. The results of the structural and compositional characterization, SQUID, conductivity, and specific heat studies will be presented and discussed within the constructed phase diagramm of the Rb-Fe-Se system, which includes several phases with different magnetic and conductivity behavior.

Particular attention in the talk will be given to phase separation phenomena which provide an explanation for the coexistence of superconductivity and static antiferromagnetic order. The recent results of neutron scattering, Mössbauer spectroscopy, muon spin rotation, and nuclear magnetic resonance investigations which support the scenario of the phase separation in $Rb_{0.8}Fe_{1.6}Se_2$ will be presented.

In the last part of the talk the new approach for Li-intercalation in FeSe which allowed to enhance the critical temperature up to 45 K will be discussed.

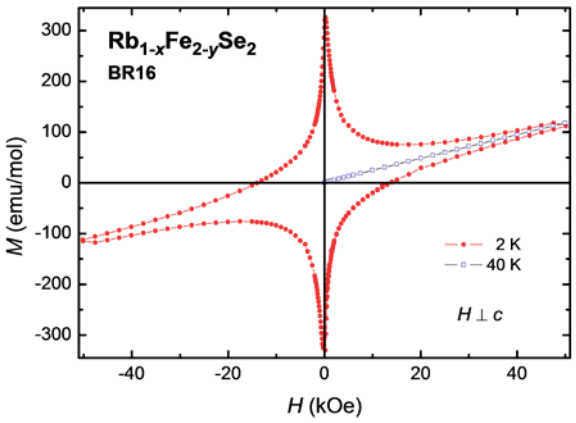

Fig.1.