FOXSI
Functional Oxide Surfaces and Interfaces

EINLADUNG

zum Vortrag
von

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Surface Phases on 122 Fe Based Superconductors: An Indication of Charge Density Wave Fluctuations?

am

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Abstract:

In addition to the cuprate superconductors a second class of unconventional superconductors was discovered in 2006 by Hideo Hasono, the iron-based superconductors. The discovery refueled the quest for a rigorous theory of high-temperature superconductivity. Since in both classes of materials the parent compounds exhibit antiferromagnetic order, which is quenched upon doping, it is widely assumed that antiferromagnetic fluctuations are responsible for the pairing interaction. Recently, scanning tunneling microscopy studies of the cleavage surfaces of so-called 122 Fe based superconductors revealed long-range ordered structures with an unexpected temperature dependence. The observations sparked a controversy about the origin of these surface phases.

We have found a similar anomalous phase transition in a much simpler system, i.e. halogens on the strongly anisotropic Pt(110) surface. Here the phase transition is driven by charge density wave fluctuations in the substrate. An extended Landau model of the phase transition is presented. The model captures both, the temperature dependence and the relative stability of the different structures with respect to chemical composition for halogen/Pt(110) as well as for the 122 Fe superconductors. The proposed interpretation for the superconductor surface structures implies the presence of charge density wave fluctuations with a wave vector differing from that of the antiferromagnetic spin fluctuations. If confirmed, this model would offer an alternative channel for the pairing interaction.

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