

Validation of the spin-fluctuation model for Fe-based superconductors

Dr. Igor Mazin, Naval Research Laboratory, Washington, USA

Abstract:

The spin-fluctuation model, proposed immediately after the discovery of Fe-based superconductors, remains the most popular scenario for this phenomenon. On the other hand, recently other proposals have been put forward, such as charge or orbital fluctuations. Criticism of the spin-fluctuation mechanism is often (nearly always) based upon a specific, weak coupling interpretation, which implies an intimate connection between the Fermi surface shape, in particular its nesting properties, and superconductivity. The critics attack the spin-fluctuation model based on materials that are superconducting yet have the Fermi surface lacking electron-hole nesting, or those that do have the desired Fermi surface, yet are not superconducting. In this talk I will discuss such criticisms, in particular I will explain why MgGeFe is not superconducting despite having a Fermi surface very similar to superconducting pnictides. I will also touch upon new experimental evidence relevant to validation of the spin-fluctuation model.