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" Interplay between superconductivity and magnetism in cuprates and organic superconductors "

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Αίθουσα σεμιναρίων στο ισόγειο του ΕΙΕ

Interplay between superconductivity and magnetism in cuprates and organic superconductors

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The mechanism of superconductivity in HTc and organic conductors is still a controversial issue. However, the phase diagrams of these materials show a common feature which is the proximity of the AF phase to the superconducting one. The natural question which arises at this point concerns the correlation between these two phases: do they compete or coexit ?

The presence of the AF phase in the vicinity of the SC state, which turns out to be crucial for the stability of superconductivity, depends on different parameters such as hydrostatic pressure, chemical pressure (substitution), magnetic field, cooling rate, impurities...

We have studied different aspects of the interplay between these phases. We have focused of the magnetic field induced coexistence of AF and SC phases and the effect of superconducting fluctuations in HTc.

On the other hand, we have proposed a possible scenario for the mechanism of superconductivity in the quasi-two dimensional organic conductors (ET) salts based on spin fluctuation mediated interactions. Furthermore, we have studied the unusual temperature behaviour of the normal state and the spin fluctuation effects on transport and magnetic properties.

Moreover, we have derived a theoretical model to deal with the inhomogeneous superconductivity in different compounds as the quasi-one dimensional organic conductors $(TM)_2X$ salts and ET salts. Within this model, it is possible to account for the behavior of the superconducting transition temperature as a function of disorder which is determinant in low dimensional superconductors. We have also studied the stability of the superconducting state in a rope of carbon nanotubes as a function of disorder to account for recent experimental results revealing the presence of a disorder induced superconductivity.

The study of these different aspects is a trial to shed light on many controversial features in the physics of low dimensional and HTc superconductors.