



AVVISO di SEMINARIO

Il giorno lunedì 14 maggio 2018 alle ore 15:00

presso l'Area della Ricerca CNR di Pisa, Aula 33, piano Terra, Edificio "A"

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terrà un seminario sul tema:

Scanning Probe Microscopy studies of magnetically and electrically coupled Superconductor/Ferromagnet systems

The study of Superconductor/Ferromagnet (S/F) hybrids has recently caught a lot of attention due to its great potential in both the development of new clean energy technologies and the broad perspectives in the spintronic field. When only magnetically coupled S/F hybrids are mainly studied because of the strong pinning potential that the F layer exerts on superconducting vortices, preventing their motion and reducing the energy dissipation. In such a scenario, nano-variations in size and geometry of S and F layers strongly affect vortex pinning and dynamics, making crucial a deep investigation at the nanoscale. On the other side, if S and F are electrically coupled and F has a local inhomogeneous magnetization at the nano-scale, the occurrence of electron spin-triplet pairing, with non-zero projection of the spin angular momentum on the magnetization axis is predicted to occur. Scanning probe microscopy techniques, such as magnetic force microscopy (MFM) and scanning tunneling microscopy and spectroscopy (STM/STS), at low temperature and in external magnetic field, are thus the right tools for these investigations.

In this talk I will present some results (combining MFM and STM/STS) of my experimental research, mainly focusing on the behavior of superconducting vortices in a magnetically coupled S/F systems made by planar Nb/Py bilayer. In particular, I will discuss vortex pinning along the stripe-like magnetic domains of Py, spontaneous nucleation of vortex-antivortex pair due to the underlying magnetic template and vortex clustering at the stripe defects (bifurcations). On the other hand, I will briefly introduce some preliminary and very recent results (STM/STS) on electrically coupled S/F systems. Here, 2D semiconducting mono-layer islands of MoS₂ have been interfaced with Pb, a centrosymmetric singlet superconductors with spin-orbit coupling. In such a MoS₂/Pb system spin-triplet supercurrents are theoretically predicted to appear close to the edge of MoS₂ islands, where inhomogeneous magnetization should occur.