The Superconductor Insulator Transition in Electrostatically Doped La_2CuO_{4+d}

Javier García-Barriocanal

Departmento de Física Aplicada, Universidad Complutense de Madrid

The application of Field Effect Transistor (FET) concepts to electrostatically doped strongly correlated electron systems has been the focus of intense research during the last years [1] due to its potential impact on applied and basic science. From the technological point of view, the control of the charge carrier density by means of an applied electric field may provide a tool to modify the electronic and magnetic properties of novel materials in a reversible way. From a fundamental point of view, electrostatic doping would allow the systematic study of electronic cor-relations as a function of essential quantities such as electrostatic repulsion, hopping amplitude…, without altering the level of disorder associated with conventional chemical substitution.

In this talk I will show our recent results on Electronic Double Layer Transistor (EDLT) techniques applied to high T_C cuprates. The EDLT configuration, which employs ionic liquids as gate dielectrics, has succeeded in achieving unprecedented charge transfers, of the order of 10^{15} carriers/cm^2. This large accumulation and depletion of carriers allowed us to explore the phase diagram of La_2CuO_{4+d} in great detail. I will focus on the physics of the superconductor to insulator transition of high quality samples produced by ozone assisted Molecular Beam Epitaxy.