Book of Abstracts

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MAGNETIC ANOMALY IN ELECTRON DOPED $BaTiO_3$: EVIDENCE OF SPIN SINGLET GROUND STATE

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Although every high-school physics student knows that electrons should repel each other, there are several type of materials where this basic law appears not to apply. One of them is conventional BCS superconductors, where electrons couple to form Cooper pairs. The possibility of the phonon-mediated real-space pairing of electrons into a spin singlet ground state in materials with a high static dielectric constant has been a topic of speculations for a number of years. Recently we have found that this scenario may actually happen in $BaTiO_3$, a material that has been well known and extremely well studied for the last 60 years. In this lecture I will present our magnetic susceptibility and electrical resistivity data on Nb-doped $BaTiO_3$ which show a clearcut evidence of the lattice driven pairing of "itinerant" electrons into immobilized intersite small bipolarons.

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STRUCTURE PECULIARITIES, OXYGEN NONSTOICHIOMETRY AND MAGNETIC PROPERTIES OF $(La,Sr)(Mn,Me)O_3$ MANGANITES DOPED WITH d-METALS

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A colossal magnetoresistance is observed in lanthanum manganites with perovskite structure, which allows them to be considered as promising materials for developing the new generation of magnetic sensors and magnetic information readers. One of the important scientific and technical questions is decreasing the controlling external magnetic field. To this end the substitutions of manganese by d-metals are performed according to the formula $(La,Sr)(Mn,Me)O_3$ (Me = d-metals). But in the literature the questions relating to the mechanism of charge compensation in the case of such substitution are elucidated scantily.
Therefore the aim of this work was to investigate systematically the structure, electrophysical and magnetic properties of $(La,Sr)(Mn,Me)O_3$ (Me = Ti, Cr, Fe, Cu) in order to determine the mechanism of charge compensation.
Using a known computing technique, the unit cell parameters in systems $(La,Sr)(Mn,Me)O_3$ have been calculated. Comparison with experimental data obtained by Rietveld X-ray full-profile analysis as well as analysis of magnetic and electrophysiscal properties allowed us to suggest possible mechanisms of charge compensation in the case of substitution of manganese by d-metals. It has been shown that the mechanism of charge compensation may be complicated due to changes in the concentration of intrinsic defects in manganites.