Possibility of the Quantum Phase Transition in Non-Superconducting Ni-Substituted La$_{2-x}$Sr$_x$Cu$_{1-y}$Ni$_y$O$_4$

KENSUKE SUZUKI, YOICHI TANABE, TADASHI ADACHI, YOJI KOIKE, Department of Applied Physics, Tohoku University, TAKAYUKI KAWAMATA, RISDIANA RISDIANA, TAKAO SUZUKI, ISAO WATANABE, Advanced Meson Science Laboratory, RIKEN Nishina Center — The possible quantum phase transition has been investigated in non-superconducting Ni-substituted La$_{2-x}$Sr$_x$Cu$_{1-y}$Ni$_y$O$_4$, in which the superconductivity observed in La$_{2-x}$Sr$_x$CuO$_4$ is suppressed by the Ni substitution without disturbing the magnetic state in the CuO$_2$ plane, from the specific heat, muon spin relaxation, electrical resistivity, magnetic susceptibility [1]. It has been concluded that the ground state changes upon hole doping from a magnetically ordered state with strong binding of a hole by Ni in the underdoped regime to a metallic state with the Kondo effect and that the quantum phase transition between two states is modified to be crossover-like due to the phase separation. [1] Y. Tanabe et al., arXiv: 0911.1016.