Abstract Submitted to the
3rd Conference on Concepts in Electron Correlation
30 September - 5 October, 2005
Hvar, Croatia

Doped 2D frustrated magnets: spin-charge separation and unconventional superconductivity

Didier Poilblanc
Laboratoire de Physique Théorique, CNRS & Université Paul Sabatier, Toulouse, France

The field of frustrated quantum two-dimensional Heisenberg antiferromagnets offers a rich playground for experimentalists and theorists to study new exotic phases of matter. I shall review briefly some properties of these systems and then consider in more details the effect of doping, an exciting new topic not yet very much investigated. In particular, the issue of the confinement of a spinon liberated by doping with a non-magnetic (static) impurity will be discussed: an intermediate behaviour between complete deconfinement (kagome) and strong confinement (checkerboard) is identified, with a spinon confinement length significantly larger than the short magnetic correlation length of the host and a reduced Z factor (J1-J2-J3 model on the square lattice) [1]. For mobile vacancies (doped holes), this translates into an extended spinon-holon boundstate allowing one to relate features of the hole spectral function [2] measured by ARPES to features accessible in real space by NMR or spin-sensitive STM experiments on impurity-doped systems. If time allows, I will also discussed briefly a new (superconducting) pairing mechanism [3].
[1] D.P. et al., cond-mat/0506810
[2] A. Laeuchli and D.P., Phys. Rev. Lett. 92, 236404 (2004).
[3] D.P., Phys. Rev. Lett. 93, 197204 (2004).

Keywords : Quantum magnets, superconductivity