

Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Spin charge separation in the doped frustrated J1-J2-J3 Heisenberg antiferromagnet on the square lattice MATTHIEU MAMBRINI, Laboratoire de Physique Theorique, UMR5152 CNRS, ANDREAS LAEUCHLI, IRRMA - EPFL, Lausanne, Switzerland, DIDIER POILBLANC, Laboratoire de Physique Theorique, UMR5152 CNRS — We study undoped and doped frustrated J1-J2-J3 Heisenberg antiferromagnet on the square lattice using both exact diagonalization techniques and projections onto the short-range RVB subspace. The insulating system shows, in the vicinity of the $(J_3 + J_2)/J_1 = 0.5$ line, a magnetically disordered ground very well captured by a RVB wave function. The nature, dimer liquid or valence bond crystal, of such a RVB phase is characterized from the computation of dimer-dimer correlations and a singlet spectrum analysis of finite clusters up to 50 sites. We also show that a substantial reduction of the quasi-particle spectral weight of a doped hole can be related to the spin liquid character of the magnetic background. This suggests that spin-charge separation occurs in such a frustrated system.

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Date submitted: 14 Dec 2004

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