

Doped spin liquid: Luttinger Sum Rule and Superconductivity

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A treatable model of spin liquid is proposed and studied. The model consists of two-leg Hubbard ladders coupled by single-particle tunneling. At half filling a semimetallic state with small Fermi pockets is induced beyond a threshold tunneling strength. The sign changes in the single electron Green's function relevant for the Luttinger sum rule now take place at surfaces with both zeroes and infinities with important consequences for the interpretation of ARPES experiments. Residual interactions between electron and hole-like quasiparticles cause a transition to long range order at low T. The theory can be extended to small doping leading to superconducting order.