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Extremely Correlated Fermi Liquids

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A new framework is reported for calculating the properties of extremely correlated electronic systems with eliminated double occupancy. Based on Schwinger's approach to field theory, it avoids using auxiliary variables, and leads to a low (particle) density expansion with equations that approximately double the complexity of the standard theory for interacting electrons. Concrete results for the one electron spectral function of the *t-J* model in 2-dimension are presented to lowest non trivial order in density. These already show considerable promise in the context of cuprate superconductors. A distinguishing characteristic of this theory is the low energy long wavelength asymmetry between adding holes and particles. Prospects for its experimental observation are discussed.

References:

1. "Extremely Correlated Fermi Liquids", B. S. Shastry, arXiv:1102.2858 (2011); Phys. Rev. Letts. **107**, 056403 (2011).
2. Dynamical Particle Hole Asymmetry in Cuprate Superconductors", B. S. Shastry, arXiv:1110.1032 (2011).