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Electronic Griffiths Phases and Quantum Criticality at Disordered Mott Transitions

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The effects of disorder are investigated in strongly correlated electronic systems near the Mott metal-insulator transition. Correlation effects are found¹ to lead to strong disorder screening, a mechanism restricted to low-lying electronic states, very similar to what is observed in underdoped cuprates. These results suggest, however, that this effect is not specific to disordered d-wave superconductors, but is a generic feature of all disordered Mott systems. In addition, the resulting spatial inhomogeneity rapidly increases² as the Mott insulator is approached at fixed disorder strength. This behavior, which can be described as an Electronic Griffiths Phase, displays all the features expected for disorder-dominated Infinite-Randomness Fixed Point scenario of quantum criticality.

¹E. C. Andrade, E. Miranda, and V. Dobrosavljevic, Phys. Rev. Lett., **102**, 206403 (2009).

²E. C. Andrade, E. Miranda, and V. Dobrosavljevic, Phys. Rev. Lett., **104** (23), 236401 (2010).