Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Landau theory of Anderson localization and STM spectra in $Ga_{1-x}Mn_xAs$ S. MAHMOUDIAN, V. DOBROSAVLJEVIC, Florida State University, E. MIRANDA, State University of Campinas, Brazil — The recently developed Typical Medium Theory[1] provides the conceptually simplest order parameter description of Anderson localization by self-consistently calculating the geometrically-averaged (typical) local density of states (LDOS). Here we show how spatial correlations can also be captured within such a self-consistent theory, by utilizing the standard Landau method of allowing for (slow) spatial fluctuations of the order parameter, and performing an appropriate gradient expansion. Our theoretical results provide insight into recent STM experiments, which were used to visualize the spatially-fluctuating electronic wave functions near the metal insulator transition in $Ga_{1-x}Mn_xAs$.[2] We show that, within our theory, all features of the experiment can be accounted for by considering a model of disorder renormalized by long-range Coulomb interactions. This includes the pseudogap formation, the $C(R) \sim 1/R$ form of the LDOS autocorrelations function, and the $\xi \sim 1/E$ energy dependence of the correlation length at criticality.

[1]V. Dobrosavljević, Int. J. Mod. Phys. B **24**, 1680 (2010).
[2]A. Richardella *et al.*, Science **327**, 665 (2010).

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Date submitted: 14 Nov 2013 Electronic form version 1.4