Abstract Submitted
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Role of long range Coulomb interaction near the disorder driven metal-insulator transition in $Ga_{1-x}Mn_xAs$ S. MAHMOUDIAN, Florida State University, E. MIRANDA, Univ. of Campinas, V. DOBROSAVLJEVIC, Florida State University — Surprising signatures of interaction effects on disorder-driven localization have recently been observed by scanning tunneling microscopy of $Ga_{1-x}Mn_xAs$, where visualizing the electronic wave function near the metal-insulator transition revealed[1] a pronounced suppression of the local tunneling density of states (LDOS) and enhanced localization only near the Fermi energy. These features highlight the limitation of the non-interacting picture, and point to the crucial importance of the long-range Coulomb interaction. Here, we implement a theoretical approach based on the recently developed Typical-Medium Theory,[2] the conceptually simplest approach to interaction-localization. We show that the presence of long-range Coulomb interaction leads to the simultaneous opening of a soft pseudogap in both the typical (geometrically averaged) and the average (algebraically averaged) LDOS, as the transition is approached. This result is consistent with the experimentally observed features of the STM spectra, suggesting new experiments that should be performed to fully characterize the quantum critical behavior at the metal-insulator transition

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

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