MAR05-2004-010072

Abstract for an Invited Paper
for the MAR05 Meeting of
the American Physical Society

Novel Inhomogeneous Metallic Phase in a Disordered Mott Insulator in Two Dimensions[1]

NANDINI TRIVEDI, Department of Physics, Ohio State University

We show that with increasing site disorder, the spectral gap in a 2D Mott insulator closes beyond a critical disorder strength V1 while antiferromagnetism persists up to a higher disorder strength V2. Most unexpectedly, in the intermediate disorder regime between V1 and V2, we find that the system is metallic and sandwiched between the Mott insulator below V1 and an Anderson type insulator above V2. The unusual metal is formed when the spectral gap gets destroyed locally in regions where the disorder potential is high enough to overcome the interelectron repulsion. Puddles with enhanced charge fluctuations are generated which percolate with increasing disorder, resulting in a spatially inhomogeneous metallic phase.

D. Heidarian and N. Trivedi, Phys. Rev. Lett. 93, 126401 (2004).

[1]In collaboration with D. Heidarian.