Effect of phase fluctutations on the spectral function of disordered s-wave superconductors[1] KARIM BOUADIM, YEN LEE LOH, NANDINI TRIVEDI — We extract the dynamical properties of a disordered s-wave superconductor using a combination of auxiliary field Quantum Monte Carlo and analytic continuation methods. By comparing with self-consistent Bogoliubov-de Gennes mean field theory for the same disorder realizations, we are able to obtain fundamentally new insights into the roles of amplitude and phase fluctuations across the disorder-driven superconductor-insulator transition. The disordered superconductor is found to self-organize into local superconducting puddles embedded in an insulating matrix [1]. At finite temperature, the density of states shows coherence peaks below T_c, but only a pseudogap above T_c. Finally, we discuss the behavior of both local and global densities of states in connection to recent scanning tunneling spectroscopy experiments in thin superconducting films [2].

[1] A. Ghosal et al., Phys. Rev. Lett. 81 3940 (1998);Phys. Rev. B 65, 014501 (2001).
[2] Sacepe et al, Phys. Rev. Lett. 101, 157006 (2008).

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