

Abstract Submitted
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Spectroscopic probes of the disorder-driven superconductor-insulator transition¹ MOHIT RANDEIRA, KARIM BOUADIM, YEN-LEE LOH, NANDINI TRIVEDI, The Ohio State University — In spite of decades of research, the mechanism of the disorder-driven superconductor-insulator transition (SIT) and the nature of the insulator are not understood. We use quantum Monte Carlo simulations that treat, on an equal footing, inhomogeneous amplitude variations and phase fluctuations, a major advance over previous theories. The energy gap in the density of states survives across the transition, but coherence peaks exist only in the superconductor. A characteristic pseudogap persists above the critical disorder and critical temperature, in contrast to conventional theories. Surprisingly, the insulator has a two-particle gap scale that vanishes at the SIT, despite a robust single-particle gap. Our predictions are testable with scanning probe experiments.

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