

MAR13-2012-020165

Abstract for an Invited Paper
for the MAR13 Meeting of
the American Physical Society

Fate of the Higgs mode near quantum criticality

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The Higgs mode is a ubiquitous collective excitation in condensed matter systems with broken continuous symmetry. It is expected in antiferromagnets, short coherence length superconductors, charge density waves, and lattice Bose condensates. Its detection is a valuable test of the corresponding field theory, and its mass gap measures the proximity to a quantum critical point. However, since the Higgs mode can decay into low energy Goldstone modes, its experimental visibility has been questioned. Here we show that the visibility of the Higgs mode depends on the symmetry of the measured susceptibility. Furthermore, we investigate the evolution of the Higgs mode upon approach to the Wilson-Fisher fixed point in 2+1 dimensions and demonstrate that the Higgs mode survives as a universal resonance in the scalar susceptibility arbitrarily close to the quantum critical point.