

Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Visibility of the Amplitude (Higgs) Mode in Condensed Matter and Cold Atomic Systems DANIEL PODOLSKY, ASSA AUERBACH, Physics Department, Technion – Israel Institute of Technology, DANIEL P. AROVAS, Department of Physics, University of California at San Diego — The amplitude 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 amplitude mode can decay into low energy Goldstone modes, its experimental visibility has been questioned. Here we show that the visibility depends on the symmetry of the measured susceptibility. We discuss various experimental setups for measuring the scalar susceptibility. We show that the optical conductivity of the O(2) theory (relativistic superfluid) displays a threshold behavior at the Higgs mass.

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Date submitted: 08 Nov 2011

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