

Broadband microwave study of 2D superconductor-insulator quantum phase transition

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We incorporated a 8 Tesla magnet into our newly developed Corbino broadband microwave spectrometer, which allows us to perform measurements over a range from 0.21 GHz to 15 GHz at temperatures down to 300 mK. We investigate the complex AC conductance of disordered InO_x films as a function of magnetic field through the 2D superconductor-insulator quantum phase transition. We study the behaviors of the frequency dependent complex response function of a particular InO_x sample near the critical point in the limit of $\hbar\omega < K_B T$ and $\hbar\omega > K_B T$ and compare our results to theoretical models. We carry out a fully dynamic investigation of how superconductivity is destroyed through the transition. Our data would show evidence for this particular InO_x film whether Bosonic or Fermionic picture of the quantum phase transition could apply.

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