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AC evidence of a field tuned 2D superconductor-metal transition in a low-disorder InO_x film WEI LIU, LIDONG PAN, JIAJIA WEN, Johns Hopkins University, MINSOO KIM, SAMBANDAMURTHY GANAPATHY, SUNY Buffalo, PETER ARMITAGE, Johns Hopkins University — Employing microwave spectroscopy, we investigated the field tuned quantum phase transition between the superconducting and the resistive states in a low-disorder amorphous InO_x film in the frequency range of 0.05 to 16 GHz. Our AC measurements are explicitly sensitive to the critical slowing down of the characteristic frequency scales approaching a transition. The relevant frequency scale of superconducting fluctuations approaches zero at a field B_{sm} far below the field B_{cross} where different isotherms of resistance as a function of magnetic field cross each other. The phase stiffness at the lowest frequency vanishes from the superconducting side at B $\approx B_{sm}$, while the high frequency limit extrapolates to zero near B_{cross}. Our data are consistent with a scenario where B_{sm} is the true quantum critical point for a transition from a superconductor to an anomalous metal, while B_{cross} only signifies a crossover to a regime where superconducting correlations make a vanishing contribution to both AC and DC transport measurements in the low-disorder limit.

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