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Examining the low energy electrodynamics of the superconductor-insulator transition in the potential topological superconductor $\mathbf{Tl_4(Tl_{1-x}Sn_x)Te_3}$[1] N. J. LAURITA, K. A. ARPINO, S. M. KOOPAYEH, T. M. MCQUEEN, N. P. ARMITAGE, Institute for Quantum Matter, Johns Hopkins University — The search for an intrinsic single crystal topological superconductor is one of the most dynamic areas of modern condensed matter physics. One of the best candidates of such a material is Tl_5Te_3 ($T_c = 2.3K$), which previous ARPES measurements have shown possesses a Dirac cone within its superconducting gap. However, the fundamental nature of superconductivity, i.e. the superconducting order parameter, in Tl_5Te_3 remains unknown. Additionally, it has been shown that Tl_5Te_3 undergoes a superconducting-insulator transition upon doping with Sn. With no band parity inversion expected in the fully Sn doped compound one expects a topological supercondutor - trivial insulator transition, the nature of which is also unknown. In this work we use highly sensitive microwave cavity perturbation measurements, a direct probe of the superfluid density, to study the low energy electrodynamics of superconductivity in Tl_5Te_3 and its corresponding superconductor-insulator transition upon Sn doping.

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