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Ghost critical field and weak localization phenomena in superconducting Tantalum Nitride films NICHOLAS BREZNAY, AHARON KAPITULNIK, Stanford University — We study the appearance of superconducting fluctuations and weak localization effects in disordered conducting thin films using magnetotransport measurements. At temperatures above Tc, we observe a positive magnetoresistance that is 4 orders of magnitude larger than the predicted classical effect. Well above Tc this behavior is consistent with the magnetic field dependence of localization quantum corrections to the conductivity in the presence of strong spin-orbit scattering. Close to Tc the observed magnetoresistance is well described by theories that describe both localization and superconducting fluctuations effects. This analysis allows for careful study of the so-called ghost critical field and inelastic scattering rates close to Tc.

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