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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 a disordered thin film of Tantalum Nitride using magnetotransport measurements. At temperatures above T_c , we observe a large positive magnetoresistance that is 4 orders of magnitude larger than the predicted classical effect. Well above T_c 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 T_c and at low magnetic fields the observed magnetoresistance is well described by recent theories that describe both localization and superconducting fluctuations effects. This analysis allows for quantitative study of the inelastic scattering time and the so-called ghost critical field.

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