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Enhancement of superconductivity near a nematic quantum critical point SAMUEL LEDERER, Stanford Univ, YONATAN SCHATTNER, EREZ BERG, Weizmann Institute of Science, STEVEN KIVELSON, Stanford Univ — In both the hole-doped cuprate and iron-based high temperature superconductors, there is evidence of a nematic quantum critical point at a critical doping near the "optimal doping" at which the superconducting Tc is maximal. Thus motivated by experiments, but without pretense that the theory is directly applicable to these materials, we consider a low T_c metallic superconductor weakly coupled to the soft fluctuations associated with proximity to a nematic quantum critical point. We show that: 1) a BCS-Eliashberg treatment remains valid outside of a parametrically narrow interval about the nematic quantum critical point; 2) the symmetry of the superconducting state (d-wave, s-wave, p-wave) is typically determined by the non-critical interactions, but Tc is enhanced by the nematic fluctuations in all channels; 3) in 2D, this enhancement grows rapidly upon approach to criticality up to the point at which the weak coupling approach breaks down, but in 3D the enhancement is much weaker. Finally, we note some consequences of the nematic-fluctuation-mediated pairing interaction, such as highly anisotropic gap functions and new collective modes.

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