

Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

4D-XY quantum criticality in a doped Mott insulator MARCEL FRANZ, ANDREW IYENGAR, University of British Columbia — We argue that the low energy, long wavelength physics of the underdoped cuprate superconductors is governed by a 4D-XY quantum critical point situated at the $T = 0$ terminus of the $T_c(x)$ line. We derive the effective action for a d-wave superconductor in the vicinity of this point and show that much of the experimentally observed phenomenology follows from it. Most notably our theory explains the puzzling features of the recent magnetic penetration depth data on YBCO crystals, such as the apparent absence of the classical thermal fluctuation regime and the observed violations of Uemura scaling.

Marcel Franz
University of British Columbia

Date submitted: 06 Dec 2004

Electronic form version 1.4