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**Anomalous Scaling of Magnetic Penetration Depth from Quantum Critical Fluctuations** JIAN-HUANG SHE, Cornell University, MICHAEL LAWLER, Cornell University and Binghamton University, EUN-AH KIM, Cornell University — Recently, systematic penetration depth (PD) measurements carried out over several families of unconventional superconductors suggest they are near quantum critical points (QCP). In particular, the temperature dependence of the PD shows anomalous power law scaling. We argue, because the momentum carried by critical fluctuations needs to connect nodal points, this anomalous behavior is not due to AFM ordering. So instead, we focus on instabilities of the d-wave superconducting state associated with developing additional Q=0 order that can alter the scaling behavior of the PD. This additional ordering can be in either the charge channel, the pairing channel or both. We find that fluctuations in the pairing channel leads to scaling exponents smaller than one, while fluctuations in the charge channel leads to scaling exponents larger than one. Based on these results, we argue that the temperature scaling of PD in CeCoIn5 is caused by close a proximity to a QCP associated predominantly with Fermi surface distortions such as a nematic QCP.

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