Abstract Submitted
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Nearly ferromagnetic superconductors[1] DIETRICH BELITZ, QI LI, University of Oregon, TED KIRKPATRICK, University of Maryland — The coexistence of ferromagnetism and superconductivity has received substantial attention over the years [1]. Here we report on a theory for the electromagnetic properties of superconductors in the paramagnetic phase near a ferromagnetic instability [2]. Using a generalized Ginzburg-Landau theory, we have found that the magnetic flux expulsion capability of the superconductor gets *stronger* as the normal-state magnetic susceptibility increases. The temperature dependencies of the London penetration depth, the critical fields, and the critical current are all strongly affected by ferromagnetic fluctuations. For the critical current we find a temperature exponent $\alpha \approx 2$ over an appreciable temperature range. The extent to which proximity to magnetic criticality may be a viable explanation for recent observations in MgCNi microfibers, which find $\alpha \approx 2$ [3], is discussed.

[1] E.I Blount and C.M. Varma, Phys. Rev. Lett. **42**, 1079 (1979); D.E. Moncton et al., Phys. Rev. Lett. **45**, 2060 (1980); J.W. Lynn et al., Phys. Rev. Lett. **46**, 368 (1981).
[2] Qi Li et al., Phys. Rev. B **74**, 134505 (2006).
[3] A.P. Young et al., Phys. Rev. B **70**, 064508 (2004).

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