Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Anomalous behaviour of critical fields near a superconducting quantum critical point in $BaFe_2(As_{1-x}P_x)_2$[1] C. PUTZKE, A. CARRINGTON, P. WALMSLEY, L. MALONE, H.H. Wills Physics Laboratory, University of Bristol, Bristol, UK, J.D. FLETCHER, P. SEE, National Physics Laboratory, Teddington, Middlesex, UK, D. VIGNOLLES, C. PROUST, S. BADOUX, Laboratoire National des Champs Magnetiques Intenses, Toulouse, France, S. KASAHARA, Y. MAZUKAMI, T. SHIBAUCHI, Y. MATSUDA, Department of Physics, University of Kyoto, Kyoto, Japan — $BaFe_2(As_{1-x}P_x)_2$ presents one of the cleanest and clearest systems in which to study the influence of quantum critical fluctuations on high temperature superconductivity. In this material a sharp maximum in the magnetic penetration depth has been found at the quantum critical point (QCP $x = 0.3$) where T_c is maximal[1]. Specific heat and de Haas-van Alphen effect measurements[2] show that this peak is driven by a corresponding increase in the quasiparticle effective mass. Based on these previous results a simple one-band theory would suggest that at the QCP we should expect a large increase in H_{c2} and a corresponding dip in H_{c1} . Actual measurements of these critical fields, which we present here, shows quite different behavior which we suggest is caused by an anomalous enhancement in the vortex core energy close to the QCP.

[1] K.Hashimoto *et.al.*, Science **336**, 1554 (2012)
[2] P.Walmsley, C.Putzke *et.al.*, Phys. Rev. Lett. **110**, 257002 (2013)

[1]This work was supported by the Engineering and Physical Sciences Research Council, EuroMagNET II, and KAKENHI from JSPS.

Carsten Putzke
University of Bristol

Date submitted: 15 Nov 2013 Electronic form version 1.4