

MAGNETIC FIELD INDUCED LATTICE ANOMALY INSIDE THE SUPERCONDUCTING STATE OF CeCoIn₅: EVIDENCE OF THE POSSIBLE FFLO STATE

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We performed high magnetic field linear magnetostriction experiments on CeCoIn₅ single crystals for different orientations of the applied magnetic field [1]. The experiments were carried out in the temperature range from 25 – 800 mK using a Ti capacitive dilatometer placed in a dilution fridge.

Two features are remarkable: (i) a sharp discontinuity in all the crystallographic axes associated with the upper superconducting critical field B_{c2} that becomes less pronounced as the temperature increases; (ii) a distinctive second order-like feature B_{FFLO} observed only along the c-axis in the high field ($10 \text{ T} < B < B_{c2}$) low temperature ($T < 0.35 \text{ K}$) region. This second order transition is observed only when the magnetic field lies within 20° of the ab-planes and there is no signature of it above B_{c2} , which raises questions regarding its interpretation as a field induced magnetically ordered phase. Good agreement with previous results suggests that this anomaly is related to the transition to a possible Fulde-Ferrel-Larkin-Ovchinnikov superconducting state.

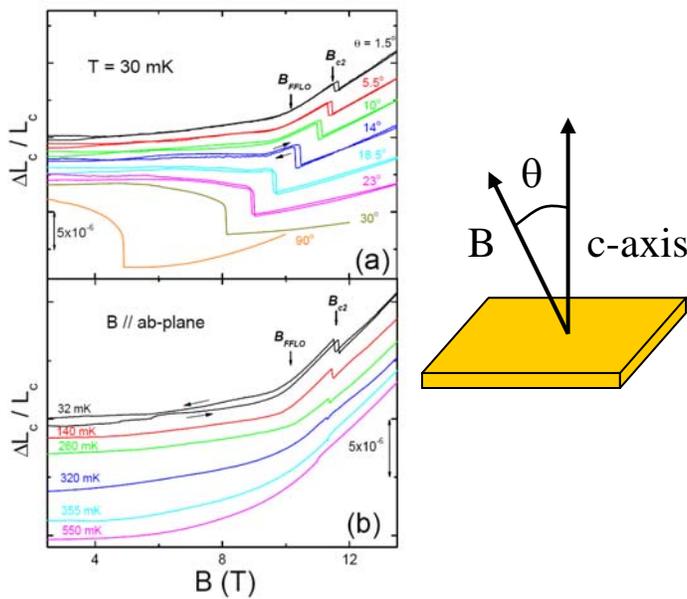


Figure 1 – Linear c-axis magnetostriction versus field for (a) different directions of the applied magnetic field and (b) at different temperatures.

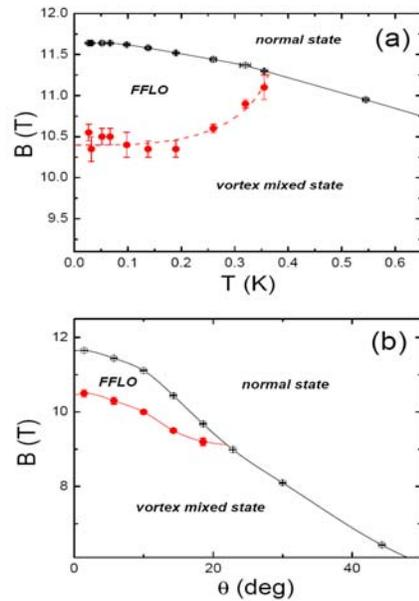


Figure 2 – (a) Magnetic field versus temperature ($B // ab$ - planes) and (b) magnetic field versus angle ($T \sim 30 \text{ mK}$) phase diagrams.

Acknowledgements

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References

[1] Correa, V.F., *et al.*, cond-mat/0609487.