Specific Heat to 0.4 K in High Magnetic Field of Iron Pnictide Superconductors

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Introduction

In the current reporting period, we measured specific heat in our own apparatus on two different Iron Pnictide systems up to 27 T: $Ba(Fe_{1-x}Co_x)_2As_2$ and $LiFe_{1-x}Cu_xAs$.

Experimental

We measured specific heat on single crystals of two systems in cell 7 at NHMFL Tallahassee.

Results and Discussion

In the $Ba(Fe_{1-x}Co_x)_2As_2$ system, for the two overdoped compositions x = 0.103 and 0.13, the low-field ($H \leq 10$ T) data show (see **Figure 1**) a Volovik-like behavior of $\gamma \propto H^{0.3-0.4}$, followed by an inflection point, followed at higher fields by $\gamma \propto H^1$. We argue that, within the two-band theory of superconductivity, an inflection point may occur if the interband coupling is dominant [1]. In the Cu-doped LiFeAs system, the γ vs H behavior is fit to a two isotropic band model, i.e. without resorting to a nodal description [2].

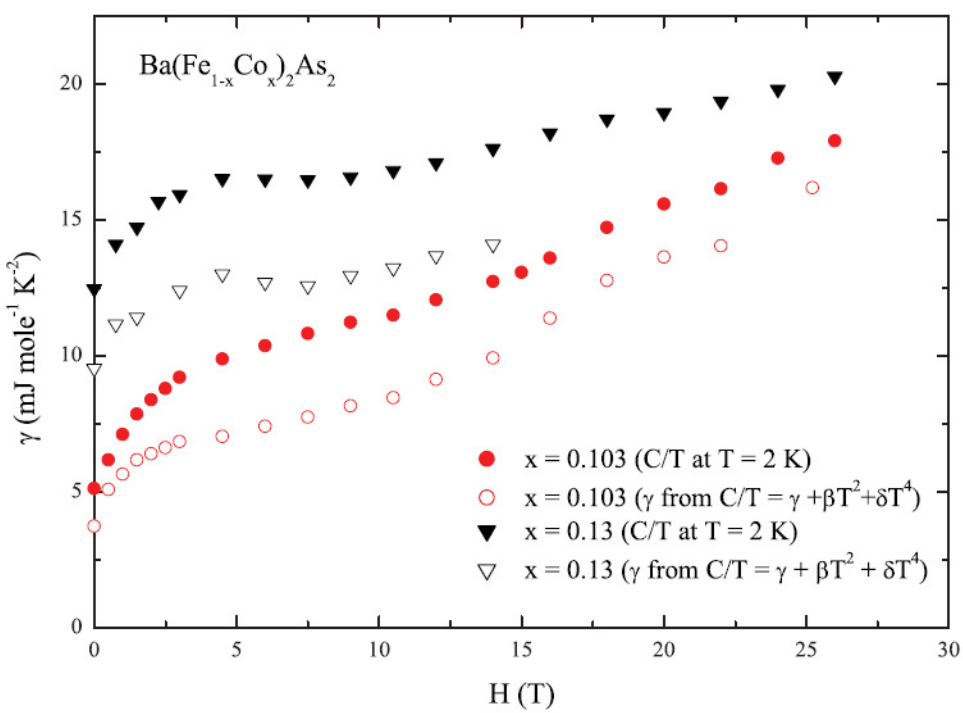

Figure 1. γ is determined by either a three term polynomial fit (open symbols) or by fitting the C/T data around 2 K and using the smoothed 2 K value (solid symbols). For both overdoped compositions, γ vs H shows an inflection point around 10 T [1].

Conclusions

Specific heat in magnetic field can help determine the nodal behavior of the new iron pnictide superconductors.

Acknowledgements

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References

[1] Kim, J. S., *et al.*, Phys. Rev. B, **86**, 014513-1-7 (2012).
[2] Kim, J. S., *et al.*, J. Phys.: Condens. Matter **24**, 475701-1-5 (2012).