

## Enhancement of Thermal Conductivity in the Superconducting State of Co-doped BaFe<sub>2</sub>As<sub>2</sub>

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We report the thermal conductivity in Co-doped BaFe<sub>2</sub>As<sub>2</sub> at under-, optimal-, and over-doping levels. We find the enhancement of the thermal conductivity divided by temperature  $\kappa/T$  in the superconducting state at all doping levels, which is strikingly similar to those in the strongly correlated superconductors, such as high- $T_c$  cuprates<sup>1</sup> and heavy fermion systems<sup>2</sup>. We also find that the enhancement of  $\kappa/T$  is strongly suppressed by applying magnetic fields. The analysis based on the vortex-scattering model, which can discriminate the quasi-particle contribution to the thermal transport from the phononic one, unveils that the enhancement of  $\kappa/T$  originates from the steep increase of the quasi-particle mean-free path possibly due to the reduction of the inelastic scattering in the superconducting state. We will also discuss the possibility of the emergence of nodes in gap structure at over-doping levels, which is suggested by the low-temperature thermal transport measurements along  $c$ -axis in this system<sup>3</sup>.

<sup>1</sup>Y. Zhang *et al.*, Phys. Rev. Lett. **86**, 890 (2001)

<sup>2</sup>Y. Kasahara *et al.*, Phys. Rev. B **72**, 214515 (2005).

<sup>3</sup>J.-Ph. Reid *et al.*, Phys. Rev. B **82**, 064501 (2010).