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Field dependence of thermal conductivity in $X\mathrm{Fe_2As_2}$ (X = K, Rb, Cs) PATRICK BOURGEOIS-HOPE, F.F. TAFTI, B. VINCENT, N. DOIRON-LEYRAUD, L. TAILLEFER, University of Sherbrooke, Sherbrooke, Canada, A.F. WANG, X.-G. LUO, X.H. CHEN, University of Science and Technology of China, Hefei, China — There is ongoing debate over the pairing symmetry in the hole-overdoped iron-based superconductor KFe_2As_2. While thermal conductivity [1] and penetration depth [2] data have been taken as evidence of a d-wave pairing state, heat capacity [3] and ARPES [4] have been interpreted within an s-wave state with accidental nodes on some parts of the Fermi surface. Here we report a complete study of the magnetic field dependence of thermal conductivity in the T = 0 limit for the isostructural materials XFe_2As_2 with X = K, Rb and Cs. Extending our previous study of KFe_2As_2 to $RbFe_2As_2$ and $CsFe_2As_2$ reveals a universal behaviour, implying that all three materials must have a very similar nodal structure. All data are found to be in excellent agreement with calculations for a d-wave superconductor. A similar nodal quasiparticle behaviour across different materials is natural within a d-wave state, a common nodal structure being automatically imposed by symmetry. By contrast, such similarity would be highly coincidental if nodes are accidental, as in an s-wave state.

[1] J.-Ph. Reid et al., PRL 109, 087001 (2012).
[2] H. Kim et al., PRB 89, 174519 (2014).
[3] F. Hardy et al., JPSJ 83, 014711 (2014).
[4] K. Okazaki et al., Science 337, 1314 (2012).

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