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Pairing symmetry of the hydrated cobaltate superconductor

GUO-QING ZHENG, Okayama University

We report NMR/NQR measurements on the hydrated cobaltate superconductor $\text{Na}_x\text{CoO}_2 \cdot 1.3\text{H}_2\text{O}$ at elevated pressures. The spin-lattice relaxation rate ($1/T_1$) decreases below T_c with no coherence peak [1], and is in proportion to T^3 down to $T \sim T_c/10$, which provides compelling evidence for the existence of line nodes in the gap function [2,3]. The spin susceptibility obtained from the Knight shift measurement in a single crystal decreases below T_c along all crystal-axis directions [4]. These results indicate anisotropic, spin-singlet pairing, and are most consistent with a d -wave gap. The electron correlations in the normal state are antiferromagnetic-like, which increases with decreasing Na-content [1,2]. The phase diagrams of T_c and various physical properties as functions of Na-content [2], and pressure [3] will be presented, and the inter-relation between the superconductivity and the spin correlations will be discussed.

References:

- [1] T. Fujimoto, G. - q. Zheng, Y. Kitaoka, R.L. Meng, J. Cmaidalka, and C.W. Chu, Phys. Rev. Lett. **92**, 047004 (2004).
- [2] G. - q. Zheng, K. Matano, R.L. Meng, J. Cmaidalka, and C.W. Chu, J. Phys.: Condens. Matter **18**, L63 (2006).
- [3] E. Kusano, S. Kawasaki, K. Matano, G. - q. Zheng, R.L. Meng, J. Cmaidalka, and C.W. Chu, Phys. Rev. B **76**, 100506 (R) (2007).
- [4] G. - q. Zheng, K. Matano, D.P. Chen and C.T. Lin, Phys. Rev. **B73**, 180503 (R) (2006).