Nodal gap symmetry in Ba(Fe_{0.93}Co_{0.07})_2As_2 from NMR measurement in high magnetic field

SANGWON OH, S. MUKHOPADHYAY, A.M. MOUNCE, W.P. HALPERIN, Northwestern University, IL, USA, N. NI, S.L. BUD'KO, P.C. CANFIELD, Y. FURUKAWA, Ames Lab, IA, USA, A.P. REYES, P.L. KUHNS, NHMFL, FL, USA — There is conflicting evidence in pnictide superconductors for fully gapped s_{\pm} wave symmetry or gap nodes at the Fermi surface. Here we report measurements of the $^{75}$As NMR Knight shift that suggest existence of gap nodes on an optimally doped single crystal of Ba(Fe_{0.93}Co_{0.07})_2As_2. The measurements were done from 2 K to 300 K with external magnetic fields from 6.4 T to 16.8 T. The spin part of the Knight shift at low temperature (< T_c/3) has linear temperature dependence. The diamagnetic vortex contribution to the Knight shift can be separated from the spin part at high magnetic field. Our results indicate a nodal gap on the Fermi surface, a conclusion also inferred from the penetration depth measurement[1]. Additionally, we have measured the spin-spin relaxation time, T_2, arising from vortex dynamics. Below T_c, T_2 decreases followed by an abrupt increase at the vortex melting temperature, consistent with a 1st order transition. [1]R. T. Gordon et al. Phys. Rev. Lett 102, 127004 (2009)

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