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Resonant spin excitation in $\mathbf{Ba_{1-x}K_xFe_2As_2}$[1] R. OSBORN, S. ROSENKRANZ, E.A. GOREMYCHKIN, D.Y. CHUNG, I.S. TODOROV, H. CLAUS, Argonne National Laboratory, A.D. CHRISTIANSON, M.D. LUMSDEN, Oak Ridge National Laboratory, C.D. MALLIAKAS, M.G. KANATZIDIS, Northwestern University, R.I. BEWLEY, T. GUIDI, ISIS Pulsed Neutron and Muon Facility — In the iron arsenides, superconductivity occurs when the antiferromagnetism of a parent compound has been suppressed by chemical doping. We have investigated the evolution of the magnetic response with potassium doping in $Ba_{1-x}K_xFe_2As_2$. In the parent compound ($x = 0$), there is evidence of a column of inelastic scattering at the AF wavevector, $Q = 1.2\text{Å}^{-1}$, consistent with a steep dispersion of gapped spin waves. A similar inelastic column is seen in the normal phase in the $x = 0.4$ compound, but it persists to lower energy transfer. However, at the superconducting transition of 38K, there is a transfer of spectral weight into an excitation localized at $Q = 1.2\text{Å}^{-1}$ and $\omega = 14$meV [A. D. Christianson *et al*, Nature, in press]. Such resonant spin excitations, which are a universal feature of the copper oxide superconductors and seen in several heavy fermion superconductors, provide evidence that the energy gap has unconventional symmetry, with opposite sign on portions of the Fermi surface connected by the resonance wavevector.

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Raymond Osborn
Argonne National Laboratory

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