Doping

Dependence of Resonant spin excitations in $\text{Ba}_{1-x}\text{K}_x\text{Fe}_2\text{As}_2$ $^1$ RAYMOND OSBORN, STEPHAN ROSENKRANZ, JOHN-PAUL CASTELLAN, FRANK WEBER, EUGENE GOREMYCHKIN, DUCK-YOUNG CHUNG, ILYA Todorov, HELMUT CLAUS, Argonne National Laboratory, MERCOURI KANATZIDIS, Northwestern University, TATIANA GUIDI, Rutherford Appleton Laboratory — The observation of a resonant spin excitation at $\omega = 14\text{meV}$ in $\text{Ba}_{0.6}\text{K}_{0.4}\text{Fe}_2\text{As}_2$ [Nature 456, 930 (2008)] provided the first phase-sensitive evidence of extended $s_\pm$ symmetry in the iron arsenide superconductors. We will discuss subsequent measurements of the doping dependence of the dynamic magnetic susceptibility in $\text{Ba}_{1-x}\text{K}_x\text{Fe}_2\text{As}_2$ from $x = 0.2$ to 0.9 using inelastic neutron scattering from polycrystalline samples. The resonance is observed below $T_c$ at all values of $x$ centered on the $\Gamma$-M point at $Q \approx 1.2\text{Å}^{-1}$, but it progressively broadens and weakens in the overdoped regime. We will discuss the scaling of the resonance energy with $T_c$ and compare the $Q$-dependence with theoretical estimates based on the evolution of the Fermi surface with hole doping.

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