Pairing symmetry and Antiferromagnetic Exchange Coupling in Fe-Based Superconductors

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I discuss the existence of strikingly identical paradigms applicable to both cuprates and iron-based superconductors in understanding magnetism, superconductivity and the interplay between the two. The magnetic states and transitions in iron-based superconductors are well described by a $J_1 - J_2 - J_z$ magnetic exchange model where $J_1$, $J_2$ and $J_z$ are nearest neighbour, next nearest neighbour and inter-layer couplings respectively. Differing from the t-J model for cuprates where d-wave pairing symmetry is favored, the magnetic exchange in the iron based superconductors predicts an unconventional s-wave $\cos k_x \cos k_y$ pairing. I will show that the predicted pairing symmetry is supported by many experimental results, and also discuss new predictions associated with the pairing symmetry.

References:
[4]: Chen Fang, B. Andrei Bernevig, Jiangping Hu,“Theory of Magnetic Order in $Fe_{1+y}Te_{1-x}Se_x$”, arXiv:0811.1294 (2008).

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