Nature of Correlations and Spin-Orbital Symmetry in Iron-Based Superconductors

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The iron-based family of high-temperature superconductors exhibits more moderate correlations than their cuprate relatives. This makes the itinerant description a reasonable starting point. But, with five iron d-orbitals and multiple electron and hole bands in play, what kind of a relatively simple model can capture the essential physics of these complex materials? Does such simplified description even exist or is everything in the details? And even if a simple model can be fashioned for pnictides will it also work for chalcogenides, which, by most accounts, appear to be more strongly correlated? I will discuss one such theoretical model, based on the U(4)XU(4) symmetry of spin and band (orbital) degrees of freedom[1]. Several experimental predictions of the theory will be discussed and various differences and similarities between pnictides and chalcogenides highlighted.

[1]J. Kang and Z. Tesanovic, Phys. Rev. B **83**, 020505(R) (2011).