Selective Mottness as a key to iron superconductors

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Abstract

The phase diagram of the high-Tc cuprates is dominated by the Mott insulating phase of the parent compounds. As we approach it from large doping, a standard Fermi-liquid gradually turns into a bad non-Fermi liquid metal, a process which culminates in the pseudogap regime, in which the antinodal region in momentum space acquires a gap before reaching a fully gapped Mott state.
I will show that experiments for electron- and hole-doped BaFe2As2 support an analogous scenario. The doping evolution is dominated by the influence of a Mott insulator that would be realized for half-filled conduction bands, while the stochiometric compound does not play a special role. Weakly and strongly correlated conduction electrons coexist in much of the phase diagram, a differentiation which increases with hole doping. We identify the reason for this selective Mottness in a strong Hund's coupling, which decouples the different orbitals. Each orbital then behaves as a single band Hubbard model, where the correlation degree only depends on how doped is each orbital from half-filling. Our scenario reconciles contrasting evidences on the electronic correlation strength and establishes a deep connection with the cuprates.
L. de' Medici, G. Giovannetti and M. Capone, ArXiv:1212.3966

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