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Selective Mottness as a key to iron superconductors: weak *and* strong correlations[1]

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I will discuss the strength of electronic correlations in the normal phase of Fe-superconductors and trace a comparison with cuprates. The phase diagram of the high-Tc cuprates is dominated by the Mott insulating phase of the parent compounds. Approaching it from large doping, a standard Fermi-liquid is seen to gradually turn into a bad non-Fermi liquid metal in which quasiparticles have heavily differentiated coherence depending on momentum, a process which culminates in the pseudogap regime, in which the antinodal region in momentum space acquires a gap before the material reaches 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 stoichiometric compound does not play a special role. Weakly and strongly correlated conduction electrons coexist in much of the phase diagram, a differentiation that increases with hole-doping. We identify the reason for this "selective Mottness" in a simple emergent mechanism, an "orbital decoupling," triggered by the strong Hund's coupling. When this mechanism is active charge excitations in the different orbitals are decoupled and each orbital behaves as a single band Hubbard model, where the correlation degree almost only depends on how doped is each orbital from half-filling. This scenario reconciles contrasting evidences on the electronic correlation strength, implies a strong asymmetry between hole- and electron-doping and establishes a deep connection with the cuprates. L. de' Medici, G. Giovannetti and M. Capone, ArXiv:1212.3966

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