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Impact of Hund's rule on the physics of the Fe-based superconductors

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The Hund's rule coupling J_H, as opposed to the Coulomb interaction (Hubbard) U, plays a dominating role in the Fe-based superconductors. The strong Hund's rule coupling combined with the multi-orbital nature and special valence of the Fe $3d$ shell, as well as the small crystal fields from the surroundings of an Fe atom, lead to many experimental consequences. In this talk, I will discuss the insights from first-principles calculations based on a combination of density functional theory and dynamical mean field theory. I will demonstrate the observable effects of *Hundsness* on transport, optical conductivity, X-ray spectroscopy, angle-resolved photoemission spectroscopy, spin/magnetic excitations, and so on.

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