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Abstract for an Invited Paper
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The role of Hund's coupling in the correlations and the nematicity of iron superconductors¹

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Since their discovery in 2008 the strength and the nature of correlations in iron superconductors have been widely discussed [1]. Understanding the correlations is key to unveil the nature of the superconducting, nematic and magnetic instabilities which appear in the phase diagram. Due to their multi-orbital character, correlations in iron superconductors are strongly affected by Hund's coupling and these materials have been classified by some authors as Hund metals. For a long time there has been a strong controversy on the nature of correlations induced by Hund's coupling and its relation to Mott physics. While some authors describe Hund metals as strongly correlated systems which are not in proximity to a Mott insulating state, others, have described iron superconductors as doped Mott insulators. In the talk, after some introduction, I will first show our recent results which show that while the spin polarization of the atoms, promoted by Hund's coupling induces strong correlations, this does not necessary mean that the total charge is more localized [2]. On the contrary, in some cases this polarization promotes itinerancy [2]. I will then present a generic framework to address the correlations in iron superconductors and discuss the role of Hund's coupling in the nematicity of iron superconductors, with special emphasis on FeSe. [1] Magnetic interactions in iron superconductors: a review, E. Bascones, B. Valenzuela and M.J. Calderon, (in press) arXiv:1503.04223 [2] Electronic correlations in Hund metals. L. Fanfarillo and E. Bascones, Phys. Rev. B 92, 075136 (2015)

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