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Low energy model based on orbital selective spin fluctuations for iron superconductors BELEN VALENZUELA, Instituto de Ciencia de Materiales de Madrid ICMM-CSIC, Madrid, Spain, LAURA FANFARILLO, CNR-IOM and International School for Advanced Studies (SISSA), Trieste, Italy , LARA BENFATTO, , ISC-CNR and Department of Physics, Sapienza University of Rome, Rome, Italy — We propose a low energy model to study the magnetic and nematic phase in iron superconductors with the basic information to address the dificult problem of spin-orbital entanglement[1]. The model is based on the concept of orbital selective spin fluctuations[2]. The model turns out to have similar structure to the well-known spin-nematic model based upon band models (SNB) [3] without tensorial dependence in the orbitals. It has the advantage of addresing the orbital degree of freedom and the spin-orbital entanglement. The orbital information is encoded in the Landau parameters and in the definition of the different order parameters. This result explains in a transparent way why the well-known SNB model although simple has been very successful to address the physics of pnictides. As a result of the model we show how is able to explain the odd orbital ordering in FeSe.[4] [1] L. Fanfarillo, L. Benfatto, and B. Valenzuela, in preparation. [2] L. Fanfarillo, A. Cortijo, and B. Valenzuela, Phys. Rev. B 91, 214515 (2015) [3] R. M. Fernandes, A. V. Chubukov, J. Knolle, I. Eremin, and J. Schmalian, Phys. Rev. B 85, 024534 (2012). [4] L. Fanfarillo, J. Mansart, P. Toulemonde, H. Cercellier, P. Le Fevre, F. Bertran, B. Valenzuela, L. Benfatto, and V. Brouet, Phys. Rev. B 94, 155138 (2016)

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