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Nematicity and magnetism in FeSe and other families of Fe-based superconductors YOUICHI YAMAKAWA, Nagoya university, SEIICHIRO ONARI, Okayama university, HIROSHI KONTANI, Nagoya university — We investigate the emergence of the nematic orbital order ($n_{xz} \neq n_{yz}$) in various Fe-based superconductors based on the first-principles Hubbard models [1]. In Fe-based superconductors, spin-fluctuation-mediated large orbital-fluctuations appear because of the strong orbital-spin interplay due to the many-body effect. This effect is very significant in FeSe due to the small ratio between the Hund's and Coulomb interactions ($\bar{J}/\bar{U}$) and large d_{xz}, d_{yz}-orbitals weight at the Fermi level. For this reason, in FeSe, orbital order is established by weak spin fluctuations, so the magnetism is absent. In contrast, in LaFeAsO, the magnetic order appears just below the structural transition temperature both experimentally and theoretically. Thus, the orbital-spin interplay is the key ingredient of the wide variety of the normal-state phase diagram in Fe-based superconductors. [1] Y. Yamakawa, S. Onari, and H. Kontani, arXiv:1509.01161.

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