Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Orbital Nematic Order and Interplay with Magnetism in the Two-Orbital Model for Iron Pnictides ANDRIY NEVIDOMSKYY, ZHENTAO WANG, Department of Physics and Astronomy, Rice University — Motivated by recent ARPES measurements on FeSe [1] and LiFeAs [2] families of iron-based superconductors, we have studied the orbital nematic order and its interplay with magnetism within random phase approximation, as well as using a non-perturbative variational cluster approximation (VCA). We found that the electron and hole doping affect the two orders differently within the two-orbital Hubbard model. While hole doping tends to suppress both antiferromagnetism and orbital ordering, the electron doping suppresses magnetism faster, so that orbital nematicity is stabilized in the absence of long-range magnetic order for moderately high electron doping. This is reminiscent of the orbital nematic phase observed in FeSe in the absence of magnetism [1,3], as well as in overdoped $BaFe_2(As_{1-x}P_x)_2$ where ARPES finds splitting of d_{xz} and d_{yz} orbitals inside the superconducting phase [4]. This raises the possibility that at least in some cases, the observed electronic nematicity may be primarily due to orbital rather than magnetic fluctuations.
See arXiv:1408.1408 for more details.
[1] T. Shimojima et al, arxiv:1407.1418.
[2] H. Miao et al, Phys. Rev. B 89, 220503 (2014).
[3] S.-H. Baek et al, arXiv:1408.1875.
[4] T. Sonobe et al, unpublished.

Andriy Nevidomskyy
Department of Physics and Astronomy, Rice University

Date submitted: 12 Nov 2014 Electronic form version 1.4