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Effect of realistic finite-size impurities on Tc in Fe-based superconductors YOUICHI YAMAKAWA, SEIICHIRO ONARI, HIROSHI KONTANI, Nagoya University — Recently, the phase diagram of $\text{LaFeAsO}_{1-x}\text{H}_x$ is reported and two-dome structure of superconducting state, first dome for $x < 0.2$ with $T_c^{\text{max}} = 29\text{K}$ and second dome for $0.2 < x < 0.5$ with $T_c^{\text{max}} = 36\text{K}$, has attract great attention[1]. To clarify the origin of the second superconducting dome, we construct tight-binding models for each doping level x and investigate the spin and orbital fluctuations based on the random phase approximation. We find that the nesting between electron-hole Fermi surfaces is monotonically weakened with x and spin density wave order with momentum $\mathbf{q} = (\pi, \pi)$ disappears. In the over-doped regime for $x > 0.2$, however, the nesting between electron-electron Fermi surfaces increases, and an incommensurate spin density wave order emerges. The orbital order also shows a re-entrant phase diagram. The spin and orbital fluctuations due to the incommensurate nesting would then be the origin of the second superconducting dome reported in the H-over-doped LaFeAsO . The obtained electronic states for $x = 0.5$ are very similar to that for KFe_2Se_2 [2], which is a heavily electron doped system(0.5 electron/Fe). [1] S. Iimura, *et al.*, Nat. Commun. **3**, 943 (2012). [2] T. Saito, *et al.*, Phys. Rev. B **83**, 140512 (2011).

Youichi Yamakawa
Nagoya University

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