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Origin of the variety of superconducting gap structure in iron-based superconductors: competition between orbital and spin fluctuations SEIICHIRO ONARI, TETSURO SAITO, HIROSHI KONTANI, Nagoya University — To understand the pairing mechanism in iron-based superconductors, we study the three-dimensional gap structure based on the orbital fluctuation theory. We focus on the fully-gapped state in (i) heavily electron-doped KFe_2Se_2 [1], nodal gap structure in (ii) isovalent-doped $BaFe_2(As,P)_2$, and strongly band-dependent gap structure in (iii) hole-doped $(Ba,K)Fe_2As_2$. Based on the three-dimensional ten orbital model for (i), we obtain orbital-fluctuation-mediated fully-gapped s_{++} wave state without sign reversal. For (ii), we reproduce the loop-shaped nodal structure on the electron-Fermi surface, due to the competition between orbital and spin fluctuations. For (iii), we obtain a drastic change in the gap structure by hole-doping, reflecting the variation of orbital fluctuations due to the topological change of electron-pockets. These results indicate the significant role of orbital fluctuations in iron-based superconductors. [1] Saito et al., PRB 83, 140512(R) (2011)

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