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Origin of the lattice structure sensitivity of the superconductivity in the iron pnictides KAZUHIKO KUROKI, KATSUHIRO SUZUKI, Dept. of Applied Physics and Chemistry, The University of Electro-Communications and JST-TRIP, HIDETOMO USUI, Dept. of Applied Physics and Chemistry, The University of Electro-Communications — For the iron pnictide superconductors, we construct a five orbital model from first principles calculations [1], to which we apply random phase approximation to investigate spin fluctuation mediated pairing. In both 1111 and 122 materials, we show that the appearance/disappearance of the hole Fermi surface arising from the $d_{X^2-Y^2}$ orbital is sensitive to the pnictogen height measured from the iron planes, which in turn affects superconductivity [2]. In particular, the superconducting gap has a fully gapped sign reversing s-wave symmetry when the pnictogen height is high, while they tend to have nodes when the height is low. We also discuss some differences between 1111 and 122 materials.

[1] K. Kuroki et al., Phys. Rev. Lett. 101 (2008) 087004, erratum: Phys. Rev. Lett. 102 (2009) 109902(E).
[2] K. Kuroki et al., Phys. Rev. B 79 (2009) 224511.

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