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Phase diagram with doping dependence in phosphorous-doped iron-based superconductor and magnetic order study YUANYUAN ZHAO, YUAN-YEN TAI, C.S. TING, Department of Physics and Texas Center for Superconductivity, University of Houston — Recent experiments discover the isovalent doping can induce superconductivity in a unique iron-based superconductor, $\text{BaFe}_2(\text{As}_{1-x}\text{P}_x)_2$, through substitution of phosphorous (P) for arsenic (As). While the phosphorous (P-) doping is often considered not to alter the occupation of Fe-3d bands, surprisingly, it has the similar phase diagram just like the heterovalent doped cases: with the P-doping, the magnetic order is suppressed and the superconductivity emerges. Here we theoretically give a possible explanation of the phase diagram based on a recent minimal two-orbital tight-binding model. Moreover, through the spin susceptibility calculation, we try to study the effect of the hopping parameters on the magnetic order.

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