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Orbital-driven two-dome superconducting phases in iron-based superconductors[1] LIANGJIAN ZOU, DAYONG LIU, Institute of Solid State Physics, Chinese Academy of Sciences, FENG LU, WEIHUA WANG, Department of Electronics and Tianjin Key Laboratory of Photo-Electronic Thin Film Device and Technology, Nankai University, H. Q. LIN, Beijing Computational Science Research Center — Recent several experiments revealed that novel bipartite magnetic/superconducting phases widely exist in iron pnictides and chalcogenides. Nevertheless, the origin of the two-dome phases in iron-based compounds still remains unclear. Here we theoretically investigated the electronic structures, magnetic and superconducting properties of three representative iron-based systems, i.e. LaFeAsO1-xHx, LaFeAs1-xPxO and KFe2As2. We found that in addition to the degenerate anisotropic xz/yz orbitals, the quasi-degenerate isotropic orbitals drive these systems entering into the second parent phase. Moreover, the second superconducting phase is contributed by the isotropic orbitals rather than the anisotropic ones in the first superconducting phase, indicating an orbital-selective pairing state. These results imply an orbital-driven mechanism and shed light on the understanding of the two-dome magnetic/superconducting phases in iron-based compounds.

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