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Orbital Fluctuation Theory for $LaFeAsO_{1-x}H_x$: Pnictogen Height Instability and Superconductivity due to Orbital Fluctuations YOUICHI YAMAKAWA, SEIICHIRO ONARI, HIROSHI KONTANI, Nagoya University — The isostructural transition in the tetragonal (C_4) phase, with sizable change in the As-height, is realized in heavily H-doped LaFeAsO, Pr-doped $CaFe_2As_2$, and Na-doped $BaFe_2As_2$. Here, we study the mechanism of spin-fluctuation-driven structure transition in $LaFeAsO_{1-x}H_x$ by using the self-consistent vertex correction (SC-VC) method. In heavily-doped case ($x \sim 0.5$), the non-nematic orbital order is caused by the VC due to d_{xy}-orbital spin fluctuations, and triggers the C_4 isostructural transition. In lightly-doped case ($x \sim 0$), the orthorhombic phase is realized by the orbital-nematic order, which originates from the VC due to (d_{xz}, d_{yz})-orbital spin fluctuations. Both nematic and non-nematic orbital fluctuations contribute in realizing higher-T_c superconductivity.

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