Abstract Submitted
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Orbital fluctuation mediated superconductivity and structure transition in iron-based superconductors HIROSHI KONTANI, Nagoya University — The main features in Fe-based superconductors are summarized as (i) orthorhombic transition accompanied by remarkable softening of the shear modulus C_{66}, (ii) high-T_c superconductivity close to the orthorhombic phase, and (iii) stripe-type magnetic order induced by orthorhombicity. To understand them, we analyze the multiorbital Hubbard-Holstein model with Fe-ion optical phonons. In the random-phase-approximation (RPA), a small electron-phonon coupling constant ($\lambda \sim 0.2$) is enough to produce large orbital (=charge quadrupole) fluctuations. The most divergent susceptibility is the O_{xz}-antiferro-quadrupole (AFQ) susceptibility, which causes the s-wave superconductivity without sign reversal (s_{++}-wave state). [1] The $_{s++}$-wave state is robust against impurities, [2] consistently with experimental observations. At the same time, divergent development of $O_{x^2-y^2}$-ferro-quadrupole (FQ) susceptibility is brought by the "two-orbiton process" with respect to the AFQ fluctuations.

[1]H. Kontani and S. Onari, Phys. Rev. Lett. **104**, 157001 (2010).
[2]S. Onari and H. Kontani, Phys. Rev. Lett. **103**, 177001 (2009).

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