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Strong Electron Correlation by Virtual Phonon Exchange in Jahn-Teller Crystals MICHAEL KAPLAN, Simmons College, GEORGE ZIMMERMAN, Boston University, KAPLAN/ZIMMERMAN COLLABORATION — In Jahn-Teller crystals - crystals with at least one sublattice of ions with orbitally degenerate electronic states - virtual phonon exchange is a major source of strong electron correlation. This type of electron correlation leads to different structural and magnetic transitions the interplay of which is especially interesting in case of the triple degeneracy of the electronic ground states. The interest to these systems lately has increased as it is related to some unusual situations in perovskite and spinel structure compounds that are of big practical interest (multiferroicity, piezomagnetism, and others). Mutual influence of the antiferrodistortive XY-type and ferroelastic ZZ-type orderings mediated by magnetic external or internal interactions in such a type of crystals is under discussion. It is found that even in case of stronger interactions leading to the ferroelastic ordering the presence of magnetic interaction causes new type of structural phase transition from the ZZ- type of ordering to the XY-type. These structural transformations are accompanied by specific anomalies in the temperature and external magnetic field dependences. The thermodynamics of the systems with strong electron correlation leading to such a phase transitions is analyzed.

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