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Competition of Structural Orderings in Presence of Magnetic Interactions MICHAEL KAPLAN, Simmons College, GEORGE ZIMMERMAN, Boston University — The competition of two types of structural phase transitions in crystals with triple degenerate ground electronic states of transition metal ions is considered in the framework of the cooperative Jahn-Teller effect. The signs of the spontaneous deformations are different for the two orderings under discussion: the ferroelastic ordering corresponds to the elongation of all octahedrons in the same z- direction, while the XY-ordering of the octahedrons forms the tetragonal compression around the ions with orbital degeneracy. It is shown that the magnetic interactions orienting the magnetic moments in the z-direction (external magnetic fields or molecular magnetic fields) support the XY type of ordering. As a result of that when the two structural interactions are of the same order, it is possible that the initial ferroelastic ordering is switched to the XY-ordering as a result of a phase transition induced by the magnetic interactions. On another hand, if the magnetic interactions are stronger than both Jahn-Teller interactions responsible for the structural transitions, the transition following the magnetic one is of XY-type. This is what could explain the experimental situation in the MnV_2O_4 crystals.

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