

Magnetically driven lattice instabilities

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The spin-lattice interaction, which very recent experiments suggest is significant in the layered perovskites, is modeled by adding to the coupling constant of the anisotropic Heisenberg antiferromagnet a linear dependence on the lattice configuration. It is found that (a) the spin-lattice interaction softens the mode with wavelength of twice the lattice parameter, (b) at finite temperatures the lattice symmetry breaks and the system becomes dimerized, and (c) the dimerization vanishes exponentially as the temperature approaches $T=0$. The calculation assumes a one-dimensional model. However, the extension to higher dimensionalities is straightforward. © 1989 The American Physical Society.