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Theory for lattice collapse and frustrated magnetism in FeAs superconductors[1] RAFAEL FERNANDES, JOERG SCHMALIAN, Ames Laboratory and Department of Physics and Astronomy, Iowa State University — We present a theory for the pressure and temperature dependence of the magnetic and structural phase transitions in FeAs superconductors. Magnetic frustration in the FeAs planes leads to an enhanced coupling between lattice and magnetic degrees of freedom and is responsible for the strength of the first order transition from a paramagnetic tetragonal to an antiferromagnetic, orthorhombic phase. We analyze the phase diagram using a large N expansion for the magnetic degrees of freedom coupled to the lattice. Furthermore, we also address the importance of the lattice collapse in the $CaFe_2As_2$ compound and compare our predictions with experiments. Our results demonstrate that it is crucial to simultaneously include lattice and magnetic degrees of freedom for the FeAs systems.

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