

Attractive interactions between critical fluctuation modes near ferroelectric and ferromagnetic quantum phase transitions

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We present evidence in displacive ferroelectrics and itinerant d-electron magnets that suggest the effective interactions between critical fluctuation modes near to quantum critical points may become attractive. This leads to a break-down of the traditional self-consistent field descriptions of such systems over a range of temperatures and tuning parameters close to the quantum phase transition. The attractive interactions can lead to a first-order phase transition at low temperature and a possible textured ordering of the magnetic or electric polarization. The origin of the attractive interactions may arise from different mechanisms some of which will be discussed.