Interplay of quantum and classical fluctuations near quantum critical points

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Near a quantum critical point (QCP), above its lower critical dimension d_L, there is a line of classical phase transitions that separates the broken symmetry phase at finite temperatures. The phase transitions along this line are governed by thermal critical exponents that are different from those associated with the quantum critical point. This is an inevitable consequence of the relevance of temperature near a QCP, i.e., that temperature *moves away* from this point under scale transformations. Quite generally this leads to an intermingling of classical and quantum critical fluctuations near the zero temperature phase transition. This is a robust, but subtle phenomenon that implies an entanglement of classical and quantum critical fluctuations. A clear experimental manifestation of this effect is the suppression of the amplitude of classical fluctuations near the line of finite temperature phase transitions as the critical temperature is reduced approaching the QCP.