Patterns of Coexisting Condensates Forming Domes Preventing the Quantum Critical Point

G. Varelogiannis[a], A. Aperis[a], P. Kotetes[a], and P.B. Littlewood[b]

[a]Department of Physics, National Technical University of Athens, Greece
[b]Department of Physics, Cavendish Laboratory, University of Cambridge, UK

Different quantum ordered states are in competition in any correlated fermionic system. Very often, a single order parameter dominates and is the one observed. We show that when this dominating order parameter is sufficiently weakened by doping, pressure, magnetic fields etc., a full pattern of coexisting condensates develops that prevents its elimination. These patterns are made of fundamental **quartets** of order parameters [1] that we can identify systematically. We argue that all dome states observed near the quantum critical points in the phase diagrams of materials as diverse as high-T_c cuprates, manganites ruthenites and various heavy fermion and organic compounds, they are all associated to specific patterns of coexisting condensates that develop as domes, preventing the formation of the quantum critical point. These domes of patterns of coexisting condensates have a common universal behavior that we put forward connecting thus situations apriori unrelated such as the high field superconducting states in $CeCoIn_5$ [2] with doping or pressure induced domes in various oxides.

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