An Integrated Quantum Critical Model

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ABSTRACT

Recent work has suggested that quasi-particles (QP) in addition to particles (P) can drive phase transitions [1]. Other systems may generate "incipient coherence", a condition whereby P or QP matter waves have begun to overlap in "incipient collective modes", but no phase transition exists (or has been observed) [2]. In several of the systems we have studied [1, 2] quantum criticality has been proposed by several others. This poster will briefly outline the background leading to universality, define quantum criticality / quantum critical points and outline a model case as an attempt to better understand the complex interactions and resulting phase diagram. Experimental observations suggest that new matter phases and entropy tend to "accumulate" in the vicinity of a QCP. A key to the proper interpretation of these phenomena is suitable computation and modified calculations have been suggested as one possible approach.

[1] March, N. H., Squire, R. H. (2011) Intern. J. Quant. Chem **119**, 89 (2011).
[2] Squire, R. H., March, N. H., Minnick, R. A., Turschmann, R., "Comparison of Various Types of Coherence and Emergent Coherent Systems", presented at Sanibel, 2012; submitted for publication.