



# Quantum Criticality and the Phase Diagrams of Strongly Correlated Electron Matter

How does order emerge from disorder at  $T=0$ , when only quantum fluctuations are present? These  $T=0$  phase transitions or 'Quantum Critical Points' are found in virtually every class of correlated electron system, including cuprates, heavy fermions, Fe-based pnictides, and organic conductors, and their presence fundamentally changes the properties of the underlying metal from which these ordered phases emerge. The critical modes have many responsibilities in quantum critical systems where they lead to the nucleation of novel phases, provide pairing for unconventional superconductors, and can even lead to the destruction of the metallic state via the localization of electrons. I will review here the basic experimental signatures of quantum critical matter, selected from classes of materials whose underlying physics is very different, and outline our emerging understanding of their unusual collective instabilities.

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BNL

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