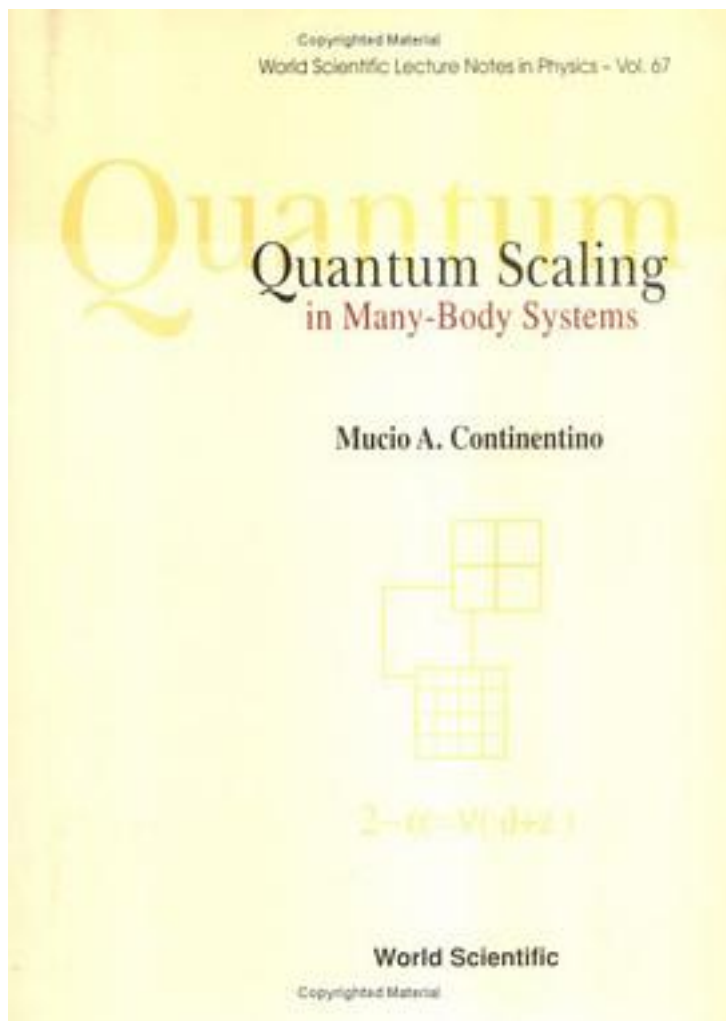# Quantum Scaling in Many-body Systems

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This book on quantum phase transitions has been written by one of the pioneers in the

application of scaling ideas to many-body systems - a new and exciting subject that has relevance to many areas of condensed matter and theoretical physics. One of the few books on the subject, it emphasizes strongly correlated electronic systems. Although dealing with complex problems in statistical mechanics, it does not lose sight of the experiments and the actual physical systems which motivate the theoretical work. The book starts by presenting the scaling theory of quantum critical phenomena. Critical exponents for different systems are calculated using both the momentum space and real space renormalization group approaches. The former is developed without the use of Feynman diagrams, allowing nonspecialists to fully appreciate the underlying physics of this method. The case of heavy fermions as an example of systems close to a zero temperature phase transition is presented and discussed in detail. This is also the case of non-Fermi liquid behaviour associated with a quantum critical point. Metal-insulator transitions are discussed within the scaling approach. The book ends with a discussion on first order quantum phase transitions, in particular those which occur due to a fluctuation-induced mechanism.

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