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Nota di contenuto	Chapter1. Introduction -- Chapter2. Saturation Transition in the 1D J-Q Model -- Chapter3. Saturation Transition in the 2D J-Q Model -- Chapter4. Signatures of Deconned Quantum Criticality in the 2D J-Q-h Model -- Chapter5. Methods -- Chapter6. Conclusions.
Sommario/riassunto	This thesis is a tour-de-force combination of analytic and computational results clarifying and resolving important questions about the nature of quantum phase transitions in one- and two-dimensional magnetic systems. The author presents a comprehensive study of a low-dimensional spin-half quantum antiferromagnet (the J-

Q model) in the presence of a magnetic field in both one and two dimensions, demonstrating the causes of metamagnetism in such systems and providing direct evidence of fractionalized excitations near the deconfined quantum critical point. In addition to describing significant new research results, this thesis also provides the non-expert with a clear understanding of the nature and importance of computational physics and its role in condensed matter physics as well as the nature of phase transitions, both classical and quantum. It also contains an elegant and detailed but accessible summary of the methods used in the thesis—exact diagonalization, Monte Carlo, quantum Monte Carlo and the stochastic series expansion—that will serve as a valuable pedagogical introduction to students beginning in this field.