



# Quantum Phase Transitions in Transverse Field Spin Models: From Statistical Physics to Quantum Information

*Amit Dutta, Gabriel Aeppli, Bikas K. Chakrabarti, Uma Divakaran, Thomas F. Rosenbaum, Diptiman Sen*

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The transverse field Ising and XY models (the simplest quantum spin models) provide the organising principle for the rich variety of interconnected subjects which are covered in this book. From a generic introduction to in-depth discussions of the subtleties of the transverse field Ising and related models, it includes the essentials of quantum dynamics and quantum information. A wide range of relevant topics has also been provided: quantum phase transitions, various measures of quantum information, the effects of disorder and frustration, quenching dynamics and the Kibble-Zurek scaling relation, the Kitaev model, topological phases of quantum systems, and bosonisation. In addition, it also discusses the experimental studies of transverse field models (including the first experimental realisation of quantum annealing) and the recent realisation of the transverse field Ising model using tunable Josephson junctions. Further, it points to the obstacles still remaining to develop a successful quantum computer.

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