Fundamental concepts of phase transitions, such as order parameters, spontaneous symmetry breaking, scaling transformations, conformal symmetry and anomalous dimensions, have deeply changed the modern vision of many areas of physics, leading to remarkable developments in statistical mechanics, elementary particle theory, condensed matter physics and string theory. This self-contained book provides a thorough introduction to the fascinating world of phase transitions and frontier topics of exactly solved models in statistical mechanics and quantum field theory, such as renormalization groups, conformal models, quantum integrable systems, duality, elastic S-matrices, thermodynamic Bethe ansatz and form factor theory. The clear discussion of physical principles is accompanied by a detailed analysis of several branches of mathematics distinguished for their elegance and beauty, including infinite dimensional algebras, conformal mappings, integral equations and modular functions.

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Giuseppe Mussardo is Professor of Theoretical Physics at the International School for Advanced Studies (ISAS) in Trieste.

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'The author is an excellent physicist who has contributed very significantly to the field, and has always shown a passion for pedagogy. He is one of a handful of people who look beyond formal theory and think in terms of physics, always trying to push the boundaries of our knowledge. I am sure this book will become a most useful and successful text for graduate students and researchers.'

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Cover image: A field configuration in the continuum limit of lattice statistical models

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Part 1 Preliminary Notions

Part 6 Non-Integrable Aspects