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Titolo	Quantum phase transitions / / Subir Sachdev [[electronic resource]]
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Edizione	[Second edition.]
Descrizione fisica	1 online resource (xviii, 501 pages) : digital, PDF file(s)
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Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
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Nota di contenuto	Machine generated contents note: Part I. Introduction: 1. Basic concepts; 2. Overview; Part II. A First Course: 3. Classical phase transitions; 4. The renormalization group; 5. The quantum Ising model; 6. The quantum rotor model; 7. Correlations, susceptibilities, and the quantum critical point; 8. Broken symmetries; 9. Boson Hubbard model; Part III. Non-zero Temperatures: 10. The Ising chain in a transverse field; 11. Quantum rotor models: large- $N$ limit; 12. The $d = 1$ , $O(N > 3)$ rotor models; 13. The $d = 2$ , $O(N > 3)$ rotor models; 14. Physics close to and above the upper-critical dimension; 15. Transport in $d = 2$ ; Part IV. Other Models: 16. Dilute Fermi and Bose gases; 17. Phase transitions of Dirac fermions; 18. Fermi liquids, and their phase transitions; 19. Heisenberg spins: ferromagnets and antiferromagnets; 20. Spin chains: bosonization; 21. Magnetic ordering transitions of disordered systems; 22. Quantum spin glasses; References; Index.

**Sommario/riassunto**

Describing the physical properties of quantum materials near critical points with long-range many-body quantum entanglement, this book introduces readers to the basic theory of quantum phases, their phase transitions and their observable properties. This second edition begins with a new section suitable for an introductory course on quantum phase transitions, assuming no prior knowledge of quantum field theory. It also contains several new chapters to cover important recent advances, such as the Fermi gas near unitarity, Dirac fermions, Fermi liquids and their phase transitions, quantum magnetism, and solvable models obtained from string theory. After introducing the basic theory, it moves on to a detailed description of the canonical quantum-critical phase diagram at non-zero temperatures. Finally, a variety of more complex models are explored. This book is ideal for graduate students and researchers in condensed matter physics and particle and string theory.

**2. Record Nr.****Titolo**

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Advanced Mathematical Science for Mobility Society / / edited by Kazushi Ikeda, Yoshiumi Kawamura, Kazuhisa Makino, Satoshi Tsujimoto, Nobuo Yamashita, Shintaro Yoshizawa, Hanna Sumita

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**Descrizione fisica**

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**Disciplina**

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**Soggetti**

Computer science  
Mathematical models  
Quantitative research  
Transportation engineering  
Traffic engineering  
Theory and Algorithms for Application Domains  
Mathematical Modeling and Industrial Mathematics  
Data Analysis and Big Data  
Transportation Technology and Traffic Engineering

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Monografia

## Nota di contenuto

Part 1. Introduction, motivation, and direction for Advanced Mathematical Science for Mobility Society, together with the project between Toyota Motor Corporation and Kyoto University -- Chapter 1. Advanced Mathematical Science for Mobility Society -- Part 2. Mathematical models of flow Chapter. 2. Analysis of many-body particle systems by geometry and box-ball-system theory -- Chapter 3. Discrete Integrable Systems, LR transformations and Box-Ball Systems -- Part 3. Mathematical methods for huge data and network analysis -- Chapter 4. Eigenvalue Analysis in Mobility Data -- Chapter 5. Application of tensor network formalism for processing tensor data -- Chapter 6. Machine Learning Approach to Mobility Analysis -- Chapter 7. Graph optimization problems and algorithms for DAG-type blockchains -- Part 4. Algorithm for mobility society -- Chapter 8. Control and optimization of one-way car-sharing systems -- Chapter 9. Algorithms for future mobility society Chapter 10. Mechanism Design for Mobility.

## Sommario/riassunto

This open access book presents the mathematical methods for huge data and network analysis. The automotive industry has made steady progress in technological innovations under the names of Connected Autonomous-Shared-Electric (CASE) and Mobility as a Service (MaaS). Needless to say, mathematics and informatics are important to support such innovations. As the concept of cars and movement itself is diversifying, they are indispensable for grasping the essence of the future mobility society and building the foundation for the next generation. Based on this idea, Research unit named "Advanced Mathematical Science for Mobility Society" was established at Kyoto University as a base for envisioning a future mobility society in collaboration with researchers led by Toyota Motor Corporation and Kyoto University. This book contains three main contents. 1. Mathematical models of flow 2. Mathematical methods for huge data and network analysis 3. Algorithm for mobility society The first one discusses mathematical models of pedestrian and traffic flow, as they are important for preventing accidents and achieving efficient transportation. The authors mainly focus on global dynamics caused by the interaction of particles. The authors discuss many-body particle systems in terms of geometry and box-ball systems. The second one consists of four chapters and deals with mathematical technologies for handling huge data related to mobility from the viewpoints of machine learning, numerical analysis, and statistical physics, which also includes blockchain techniques. Finally, the authors discuss algorithmic issues on mobility society. By making use of car-sharing service as an example of mobility systems, the authors consider how to construct and analyze algorithms for mobility system from viewpoints of control, optimization, and AI.