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Titolo	An Introduction to Stochastic Thermodynamics : From Basic to Advanced // by Naoto Shiraishi
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ISBN	9789811981869 9789811981852
Edizione	[1st ed. 2023.]
Descrizione fisica	1 online resource (437 pages)
Collana	Fundamental Theories of Physics, , 2365-6425 ; ; 212
Disciplina	519.2
Soggetti	Mathematical physics Thermodynamics Spintronics Probabilities Biophysics Theoretical, Mathematical and Computational Physics Probability Theory Mathematical Methods in Physics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Background -- Stochastic Processes -- Stochastic Thermodynamics and Fluctuation Theorems -- Fluctuation-Theorem-Type Equalities -- Information Thermodynamics and Beyond -- Large Deviation and Rate Function -- Some Results on One-Dimensional Overdamped Langevin Systems -- Quantum Fluctuation Theorem and Some Techniques in Quantum Information Theory -- Maximum Efficiency of Stationary Autonomous Engines -- Implementation of Quantum Operation by Autonomous Transient Process -- Power and Efficiency: Phenomenological Approach -- Universal Trade-Off Relation Between Efficiency and Power -- Thermodynamic Uncertainty Relation -- Bound of Speed in Quantum Non-Markovian Systems -- Speed Limit for State Transformation -- Conclusion.
Sommario/riassunto	This book presents the fundamentals of stochastic thermodynamics, one of the most central subjects in non-equilibrium statistical

mechanics. It also explores many recent advances, e.g., in information thermodynamics, the thermodynamic uncertainty relation, and the trade-off relation between efficiency and power. The content is divided into three main parts, the first of which introduces readers to fundamental topics in stochastic thermodynamics, e.g., the basics of stochastic processes, the fluctuation theorem and its variants, information thermodynamics, and large deviation theory. In turn, parts two and three explore advanced topics such as autonomous engines (engines not controlled externally) and finite speed engines, while also explaining the key concepts from recent stochastic thermodynamics theory that are involved. To fully benefit from the book, readers only need an undergraduate-level background in statistical mechanics and quantum mechanics; no background in information theory or stochastic processes is needed. Accordingly, the book offers a valuable resource for early graduate or higher-level readers who are unfamiliar with this subject but want to keep up with the cutting-edge research in this field. In addition, the author's vivid descriptions interspersed throughout the book will help readers grasp 'living' research developments and begin their own research in this field.
