1. Record Nr.	UNINA9910254628403321
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Titolo	Information Thermodynamics on Causal Networks and its Application to Biochemical Signal Transduction [[electronic resource] /] / by Sosuke Ito
Pubbl/distr/stampa	Singapore : , : Springer Singapore : , : Imprint : Springer, , 2016
ISBN	981-10-1664-X
Edizione	[1st ed. 2016.]
Descrizione fisica	1 online resource (XIII, 133 p. 32 illus., 28 illus. in color.)
Collana	Springer Theses, Recognizing Outstanding Ph.D. Research, , 2190-5053
Disciplina	536.7
Soggetti	Thermodynamics Statistical physics Dynamical systems Quantum computers Spintronics Biophysics Biological physics Physics Complex Systems Quantum Information Technology, Spintronics Biological and Medical Physics, Biophysics Numerical and Computational Physics, Simulation Statistical Physics and Dynamical Systems
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	"Doctoral Thesis accepted by The University of Tokyo, Tokyo, Japan"--Title page.
Nota di bibliografia	Includes bibliographical references at the end of each chapters.
Nota di contenuto	Introduction to Information Thermodynamics on Causal Networks -- Review of Classical Information Theory -- Stochastic Thermodynamics for Small System -- Information Thermodynamics under Feedback Control -- Bayesian Networks and Causal Networks -- Information Thermodynamics on Causal Networks -- Application to Biochemical Signal Transduction -- Information Thermodynamics as Stochastic Thermodynamics for Small Subsystem -- Further Applications of Information Thermodynamics on Causal Networks -- Conclusions.

Sommario/riassunto

In this book the author presents a general formalism of nonequilibrium thermodynamics with complex information flows induced by interactions among multiple fluctuating systems. The author has generalized stochastic thermodynamics with information by using a graphical theory. Characterizing nonequilibrium dynamics by causal networks, he has obtained a novel generalization of the second law of thermodynamics with information that is applicable to quite a broad class of stochastic dynamics such as information transfer between multiple Brownian particles, an autonomous biochemical reaction, and complex dynamics with a time-delayed feedback control. This study can produce further progress in the study of Maxwell's demon for special cases. As an application to these results, information transmission and thermodynamic dissipation in biochemical signal transduction are discussed. The findings presented here can open up a novel biophysical approach to understanding information processing in living systems.