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Soggetti	Thermodynamics Statistical physics Dynamics Statistics Mathematical physics Complex Systems Statistics for Engineering, Physics, Computer Science, Chemistry and Earth Sciences Mathematical Applications in the Physical Sciences Statistical Physics and Dynamical Systems
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Nota di bibliografia	Includes bibliographical references at the end of each chapters.
Nota di contenuto	Introduction to Physics of Fluctuation -- Markovian Stochastic Processes -- Kinetic Theory for Dilute Gas -- Langevin Equation and its Microscopic Derivation -- Stochastic Calculus for the Single-Trajectory Analysis -- Stochastic Energetics for Langevin Dynamics -- Microscopic Derivation of Linear Non-Gaussian Langevin Equation -- Analytical Solution to Non-linear Non-Gaussian Langevin Equation -- Stochastic Energetics for Non-Gaussian Stochastic Dynamics -- Energy Transport between Athermal Systems -- Energy Pumping from Athermal Systems -- Conclusion.
Sommario/riassunto	The author investigates athermal fluctuation from the viewpoints of statistical mechanics in this thesis. Stochastic methods are theoretically very powerful in describing fluctuation of thermodynamic quantities in small systems on the level of a single trajectory and have been recently

developed on the basis of stochastic thermodynamics. This thesis proposes, for the first time, a systematic framework to describe athermal fluctuation, developing stochastic thermodynamics for non-Gaussian processes, while thermal fluctuations are mainly addressed from the viewpoint of Gaussian stochastic processes in most of the conventional studies. First, the book provides an elementary introduction to the stochastic processes and stochastic thermodynamics. The author derives a Langevin-like equation with non-Gaussian noise as a minimal stochastic model for athermal systems, and its analytical solution by developing systematic expansions is shown as the main result. Furthermore, the au thor shows a thermodynamic framework for such non-Gaussian fluctuations, and studies some thermodynamics phenomena, i.e. heat conduction and energy pumping, which shows distinct characteristics from conventional thermodynamics. The theory introduced in the book would be a systematic foundation to describe dynamics of athermal fluctuation quantitatively and to analyze their thermodynamic properties on the basis of stochastic methods.