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Nota di contenuto	Nonequilibrium Statistical Physics; Contents; Preface; 1 Introduction; 1.1 Irreversibility: The Arrow of Time; 1.1.1 Dynamical Systems; 1.1.2 Thermodynamics; 1.1.3 Ensembles and Probability Distribution; 1.1.4 Entropy in Equilibrium Systems; 1.1.5 Fundamental Time Arrows, Units; 1.1.6 Example: Ideal Quantum Gases; 1.2 Thermodynamics of Irreversible Processes; 1.2.1 Quasiequilibrium; 1.2.2 Statistical Thermodynamics with Relevant Observables; 1.2.3 Phenomenological Description of Irreversible Processes; 1.2.4 Example: Reaction Rates 1.2.5 Principle of Weakening of Initial Correlations and the Method of Nonequilibrium Statistical Operator Exercises; 2 Stochastic Processes; 2.1 Stochastic Processes with Discrete Event Times; 2.1.1 Potentiality and Options, Chance and Probabilities; 2.1.2 Stochastic Processes; 2.1.3 Reduced Probabilities; 2.1.4 Properties of Probability Distributions: Examples; 2.1.5 Example: One-Step Process on a Discrete Space-Time Lattice and Random Walk; 2.2 Birth-and-Death Processes and Master Equation; 2.2.1 Continuous Time Limit and Master Equation; 2.2.2 Example: Radioactive Decay

2.2.3 Spectral Density and Autocorrelation Functions
2.2.4 Example: Continuum Limit of Random Walk and Wiener Process;
2.2.5 Further Examples for Stochastic One-Step Processes;
2.2.6 Advanced Example: Telegraph Equation and Poisson Process;
2.3 Brownian Motion and Langevin Equation;
2.3.1 Langevin Equation;
2.3.2 Solution of the Langevin Equation by Fourier Transformation;
2.3.3 Example Calculations for a Langevin Process on Discrete Time;
2.3.4 Fokker-Planck Equation;
2.3.5 Application to Brownian Motion;
2.3.6 Important Continuous Markov Processes
2.3.7 Stochastic Differential Equations and White Noise
2.3.8 Applications of Continuous Stochastic Processes; Exercises;
3 Quantum Master Equation;
3.1 Derivation of the Quantum Master Equation;
3.1.1 Open Systems Interacting with a Bath;
3.1.2 Derivation of the Quantum Master Equation;
3.1.3 Born-Markov and Rotating Wave Approximations;
3.1.4 Example: Harmonic Oscillator in a Bath;
3.1.5 Example: Atom Coupled to the Electromagnetic Field;
3.2 Properties of the Quantum Master Equation and Examples;
3.2.1 Pauli Equation;
3.2.2 Properties of the Pauli Equation, Examples
3.2.3 Discussion of the Pauli Equation
3.2.4 Example: Linear Coupling to the Bath;
3.2.5 Quantum Fokker-Planck Equation;
3.2.6 Quantum Brownian Motion and the Classical Limit; Exercises;
4 Kinetic Theory;
4.1 The Boltzmann Equation;
4.1.1 Distribution Function;
4.1.2 Classical Reduced Distribution Functions;
4.1.3 Quantum Statistical Reduced Distribution Functions;
4.1.4 The Stoßzahlansatz;
4.1.5 Derivation of the Boltzmann Equation from the Nonequilibrium Statistical Operator;
4.1.6 Properties of the Boltzmann Equation;
4.1.7 Example: Hard Spheres;
4.1.8 Beyond the Boltzmann Kinetic Equation
4.2 Solutions of the Boltzmann Equation

Sommario/riassunto

Authored by one of the top theoretical physicists in Germany, and a well-known authority in the field, this is the only coherent presentation of the subject suitable for masters and PhD students, as well as postdocs in physics and related disciplines. Starting from a general discussion of the nonequilibrium state, different standard approaches such as master equations, and kinetic and linear response theory, are derived after special assumptions. This allows for an insight into the problems of nonequilibrium physics, a discussion of the limits, and suggestions for improvements. Applications
