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Autore	Valkunas Leonas
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Nota di contenuto	Molecular Excitation Dynamics and Relaxation; Contents; Preface; Part One Dynamics and Relaxation; 1 Introduction; 2 Overview of Classical Physics; 2.1 Classical Mechanics; 2.1.1 Concepts of Theoretical Mechanics: Action, Lagrangian, and Lagrange Equations; 2.1.2 Hamilton Equations; 2.1.3 Classical Harmonic Oscillator; 2.2 Classical Electrodynamics; 2.2.1 Electromagnetic Potentials and the Coulomb Gauge; 2.2.2 Transverse and Longitudinal Fields; 2.3 Radiation in Free Space; 2.3.1 Lagrangian and Hamiltonian of the Free Radiation; 2.3.2 Modes of the Electromagnetic Field 2.4 Light-Matter Interaction2.4.1 Interaction Lagrangian and Correct Canonical Momentum; 2.4.2 Hamiltonian of the Interacting Particle-Field System; 2.4.3 Dipole Approximation; 3 Stochastic Dynamics; 3.1 Probability and Random Processes; 3.2 Markov Processes; 3.3 Master Equation for Stochastic Processes; 3.3.1 Two-Level System; 3.4 Fokker-Planck Equation and Diffusion Processes; 3.5 Deterministic Processes; 3.6 Diffusive Flow on a Parabolic Potential (a Harmonic Oscillator); 3.7 Partially Deterministic Process and the Monte Carlo Simulation of a Stochastic Process

3.8 Langevin Equation and Its Relation to the Fokker-Planck Equation
4 Quantum Mechanics; 4.1 Quantum versus Classical; 4.2 The Schrodinger Equation; 4.3 Bra-ket Notation; 4.4 Representations; 4.4.1 Schrodinger Representation; 4.4.2 Heisenberg Representation; 4.4.3 Interaction Representation; 4.5 Density Matrix; 4.5.1 Definition; 4.5.2 Pure versus Mixed States; 4.5.3 Dynamics in the Liouville Space; 4.6 Model Systems; 4.6.1 Harmonic Oscillator; 4.6.2 Quantum Well; 4.6.3 Tunneling; 4.6.4 Two-Level System; 4.6.5 Periodic Structures and the Kronig-Penney Model; 4.7 Perturbation Theory
4.7.1 Time-Independent Perturbation Theory
4.7.2 Time-Dependent Perturbation Theory; 4.8 Einstein Coefficients; 4.9 Second Quantization; 4.9.1 Bosons and Fermions; 4.9.2 Photons; 4.9.3 Coherent States; 5 Quantum States of Molecules and Aggregates; 5.1 Potential Energy Surfaces, Adiabatic Approximation; 5.2 Interaction between Molecules; 5.3 Excitonically Coupled Dimer; 5.4 Frenkel Excitons of Molecular Aggregates; 5.5 Wannier-Mott Excitons; 5.6 Charge-Transfer Excitons; 5.7 Vibronic Interaction and Exciton Self-Trapping; 5.8 Trapped Excitons; 6 The Concept of Decoherence
6.1 Determinism in Quantum Evolution
6.2 Entanglement; 6.3 Creating Entanglement by Interaction; 6.4 Decoherence; 6.5 Preferred States; 6.6 Decoherence in Quantum Random Walk; 6.7 Quantum Mechanical Measurement; 6.8 Born Rule; 6.9 Everett or Relative State Interpretation of Quantum Mechanics; 6.10 Consequences of Decoherence for Transfer and Relaxation Phenomena; 7 Statistical Physics; 7.1 Concepts of Classical Thermodynamics; 7.2 Microstates, Statistics, and Entropy; 7.3 Ensembles; 7.3.1 Microcanonical Ensemble; 7.3.2 Canonical Ensemble; 7.3.3 Grand Canonical Ensemble
7.4 Canonical Ensemble of Classical Harmonic Oscillators

Sommario/riassunto

This work brings together quantum theory and spectroscopy to convey excitation processes to advanced students and specialists wishing to conduct research and understand the entire field rather than just single aspects. Written by experienced authors and recognized authorities in the field, this text covers numerous applications and offers examples taken from different disciplines. As a result, spectroscopists, molecular physicists, physical chemists, and biophysicists will all find this a must-have for their research. Also suitable as supplementary reading in graduate level course
