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- Harmonic Perturbation of Complex Systems.- Two-Frequency Excitation of Complex Systems.- Two-Band System in a Periodic.- The Dynamics of One-Dimensional Relay-Type Systems.- Exactly Soluble Relays of Isolated Levels.- General Case of an Exactly Soluble Relay. - Smooth Variation of the Parameters.- Relay with disordered parameters.- Field Theory Method for Disordered Systems.- Population Dynamics in a Disordered Chain.- Composite Complex Quantum Systems.- Relay of Multilevel Bands -- Random Walks and Coherent Behavior.- Dynamical Localization in Complex Systems.-Spectra of Complex Systems.- Manifestation of Quantum Complexity in the State Density.- The Effect of Quantum Recurrences on the State Density Profiles.- The Density of Quantum States of Fractals.- Spectra of Euclidian Random Matrices.-Entangled States of Composite Quantum Systems.- Product States and Entangled States.- Entanglement and Quantum Informatics.- How to characterize multipartite entanglement?.- Dynamics and Entanglement for Open Quantum Systems.- Complex Quantum Systems Entangled with the Environment. - Exactly Soluble Model of Environment with a Finite Correlation Time. - Entanglement of Mixed Quantum States.- Coherence Protection and Control over Complex Quantum Systems .- Control of Complex Quantum Systems.-Coherence Control of Open Quantum Systems. - Bibliography and Problems.- Bookshelf.- Problems -- References -- Index.

Sommario/riassunto

This book gathers together a range of similar problems that can be encountered in different fields of modern quantum physics and that have common features with regard to multilevel quantum systems. The main motivation was to examine from a uniform standpoint various models and approaches that have been developed in atomic, molecular, condensed matter, chemical, laser and nuclear physics in various contexts. The book should help senior-level undergraduate, graduate students and researchers putting particular problems in these fields into a broader scientific context and thereby taking advantage of well-established techniques used in adjacent fields. This second edition has been expanded to include substantial new material (e.g. new sections on Dynamic Localization and on Euclidean Random Matrices and new chapters on Entanglement, Open Quantum Systems, and Coherence Protection). It is based on the author’s lectures at the Moscow Institute of Physics and Technology, at the CNRS Aimé Cotton Laboratory, and on other courses he has given over the last two decades.