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| Autore | Gemmer Jochen |
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| Nota di contenuto | Background -- Basics of Quantum Mechanics -- Basics of Thermodynamics and Statistics -- Brief Review of Pertinent Concepts -- Equilibrium -- The Program for the Foundation of Thermodynamics -- Outline of the Present Approach -- Dynamics and Averages in Hilbert Space -- Typicality of Observables and States -- System and Environment -- The Typical Reduced State of the System -- Entanglement, Correlations and Local Entropy -- Generic Spectra of Large Systems -- Temperature -- Pressure and Adiabatic Processes -- Quantum Mechanical and Classical State Densities -- Equilibration in Model Systems -- Non-Equilibrium -- Brief Review of Relaxation and Transport Theories -- Projection Operator Techniques and Hilbert |

Space Average Method -- Finite Systems as Thermostats -- Projective Approach to Dynamical Transport -- Open System Approach to Transport -- Applications and Models -- Purity and Local Entropy in Product Hilbert Space -- Observability of Intensive Variables -- Observability of Extensive Variables -- Quantum Thermodynamic Processes.

Sommario/riassunto

This introductory text treats thermodynamics as an incomplete description of quantum systems with many degrees of freedom. Its main goal is to show that the approach to equilibrium—with equilibrium characterized by maximum ignorance about the open system of interest—neither requires that many particles nor is the precise way of partitioning, relevant for the salient features of equilibrium and equilibration. Furthermore, the text depicts that it is indeed quantum effects that are at work in bringing about thermodynamic behavior of modest-sized open systems, thus making Von Neumann's concept of entropy appear much more widely useful than sometimes feared, far beyond truly macroscopic systems in equilibrium. This significantly revised and expanded second edition pays more attention to the growing number of applications, especially non-equilibrium phenomena and thermodynamic processes of the nano-domain. In addition, to improve readability and reduce unneeded technical details, a large portion of this book has been thoroughly rewritten. From the reviews of the first edition: This textbook provides a comprehensive approach, from a theoretical physics point of view, to the question of emergence of thermodynamic behavior in quantum systems... [Its] strength lies in the careful development of the relevant concepts, in particular the question how large a system needs to be to exhibit thermodynamic behavior is addressed. Luc Rey-Bellet (Amherst, MA), Mathematical Reviews 2007e.