Título: Equilibrium And Non-Equilibrium Statistical Mechanics. New And Revised Printing

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Sinopsis

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This book encompasses our current understanding of the ensemble approach to many-body physics, phase transitions and other thermal phenomena, as well as the quantum foundations of linear response theory, kinetic equations and stochastic processes. It is destined to be a standard text for graduate students, but it will also serve the specialist-researcher in this fascinating field; some more elementary topics have been included in order to make the book self-contained.

The historical methods of J Willard Gibbs and Ludwig Boltzmann, applied to the quantum description rather than phase space, are featured. The tools for computations in the microcanonical, canonical and grand-canonical ensembles are carefully developed and then applied to a variety of classical and standard quantum situations. After the language of second quantization has been introduced, strongly interacting systems, such as quantum liquids, superfluids and superconductivity, are treated in detail. For the connoisseur, there is a section on diagrammatic methods and applications.

In the second part dealing with non-equilibrium processes, the emphasis is on the quantum foundations of Markovian behaviour and irreversibility via the Pauli-Van Hove master equation. Justifiable linear response expressions and the quantum-Boltzmann approach are discussed and applied to various condensed matter problems. From this basis the Onsager-Casimir relations are derived, together with the mesoscopic master equation, the Langevin equation and the Fokker-Planck truncation procedure. Brownian motion and modern stochastic problems such as fluctuations in optical signals and radiation fields briefly make the round.

Contents:
Equilibrium Statistical Mechanics:
General Principles of Many-Particle Systems: Probability and Generating Functions, Ensembles, Illustrations
Classical and Quantum Formalisms: Occupation-Number States, Field Operators and Perfect

Gases
Quantum Systems with Strong Interactions: Phase Transitions, Renormalization, Aspects of Quantum Liquids and Diagrammatic Methods
Non-Equilibrium Statistical Mechanics:
Classical Boltzmann Transport Theory
Linear Response Theory and Quantum Transport: The Original Kubo-Green Formalism, Reduced Operators and Convergent Forms, Some Applications of Modified Linear Response
Stochastic Phenomena: Brownian Motion and the Mesoscopic Master Equation, Spectral Analysis, Branching Processes, Stochastic Optical Signals and Photon Fields
Appendices:
The Schrödinger, Heisenberg and Interaction Picture
Spin and Statistics