

<<平衡态统计物理学>>

图书基本信息

书名：<<平衡态统计物理学>>

13位ISBN编号：9787510024009

10位ISBN编号：7510024005

出版时间：2010-8

出版公司：世界图书出版公司

作者：普利史可

页数：620

版权说明：本站所提供下载的PDF图书仅提供预览和简介，请支持正版图书。

更多资源请访问：<http://www.tushu007.com>

前言

During the last decade each of the authors has regularly taught a graduate or senior undergraduate course in statistical mechanics. During this same period, the renormalization group approach to critical phenomena, pioneered by K. G. Wilson, greatly altered our approach to condensed matter physics. Since its introduction in the context of phase transitions, the method has found application in many other areas of physics, such as many-body theory, chaos, the conductivity of disordered materials, and fractal structures. So pervasive is its influence that we feel that it is now essential that graduate students be introduced at an early stage in their career to the concepts of scaling, universality, fixed points, and renormalization transformations, which were developed in the context of critical phenomena, but are relevant in many other situations. In this book we describe both the traditional methods of statistical mechanics and the newer techniques of the last two decades. Most graduate students are exposed to only one course in statistical physics. We believe that this course should provide a bridge from the typical under-graduate course (usually concerned primarily with noninteracting systems such as ideal gases and paramagnets) to the sophisticated concepts necessary to a researcher. We begin with a short chapter on thermodynamics and continue, in Chapter 2, with a review of the basics of statistical mechanics. We assume that the student has been exposed previously to the material of these two chapters and thus our treatment is rather concise. We have, however, included a substantial number of exercises that complement the review. In Chapter 3 we begin our discussion of strongly interacting systems with a lengthy exposition of mean field theory. A number of examples are worked out in detail. The more general Landau theory of phase transitions is developed and used to discuss critical points, tricritical points, and first-order phase transitions. The limitations of mean field and Landau theory are described and the role of fluctuations is explored in the framework of the Landau-Ginzburg model.

<<平衡态统计物理学>>

内容概要

During the last decade each of the authors has regularly taught a graduate or senior undergraduate course in statistical mechanics. During this same period, the renormalization group approach to critical phenomena, pioneered by K. G. Wilson, greatly altered our approach to condensed matter physics. Since its introduction in the context of phase transitions, the method has found application in many other areas of physics, such as many-body theory, chaos, the conductivity of disordered materials, and fractal structures. So pervasive is its influence that we feel that it now essential that graduate students be introduced at an early stage in their career to the concepts of scaling,

<<平衡态统计物理学>>

作者简介

作者：（加拿大）普利史可（Michael Plischke）

<<平衡态统计物理学>>

书籍目录

Preface to the First Edition Preface to the Second Edition Preface to the Third Edition

1 Review of Thermodynamics
 1.1 State Variables and Equations of State 1.2 Laws of Thermodynamics 1.2.1 First law 1.2.2 Second law 1.3 Thermodynamic Potentials 1.4 Gibbs-Duhem and Maxwell Relations 1.5 Response Functions 1.6 Conditions for Equilibrium and Stability 1.7 Magnetic Work 1.8 Thermodynamics of Phase Transitions 1.9 Problems

2 Statistical Ensembles 2.1 Isolated Systems: Microcanonical Ensemble 2.2 Systems at Fixed Temperature: Canonical Ensemble 2.3 Grand Canonical Ensemble 2.4 Quantum Statistics 2.4.1 Harmonic oscillator 2.4.2 Noninteracting fermions 2.4.3 Noninteracting bosons 2.4.4 Density matrix 2.5 Maximum Entropy Principle 2.6 Thermodynamic Variational Principles . 2.6.1 Schottky defects in a crystal 2.7 Problems

3 Mean Field and Landau Theory 3.1 Mean Field Theory of the Ising Model 3.2 Bragg-Williams Approximation 3.3 A Word of Warning 3.4 Bethe Approximation 3.5 Critical Behavior of Mean Field Theories 3.6 Ising Chain: Exact Solution 3.7 Landau Theory of Phase Transitions 3.8 Symmetry Considerations 3.8.1 Potts model 3.9 Landau Theory of Tricritical Points 3.10 Landau-Ginzburg Theory for Fluctuations 3.11 Multicomponent Order Parameters: n-Vector Model 3.12 Problems

4 Applications of Mean Field Theory 4.1 Order-Disorder Transition 4.2 Maier-Sanpe Model 4.3 Blume—Emery-Griffiths Model 4.4 Mean Field Theory of Fluids: van der Waals Approach 4.5 Spruce Budworm Model 4.6 A Non-Equilibrium System: Two Species Asymmetric Exclusion Model 4.7 Problems

5 Dense Gases and Liquids 5.1 Virial Expansion 5.2 Distribution Functions 5.2.1 Pair correlation function 5.2.2 BBGKY hierarchy 5.2.3 Ornstein-Zernike equation 5.3 Perturbation Theory 5.4 Inhomogeneous Liquids 5.4.1 Liquid-vapor interface 5.4.2 Capillary waves 5.5 Density-Functional Theory 5.5.1 Functional differentiation 5.5.2 Free-energy functionals and correlation functions 5.5.3 Applications 5.6 Problems

6 Critical Phenomena I 6.1 Ising Model in Two Dimensions 6.1.1 Transfer matrix 6.1.2 Transformation to an interacting fermion problem 6.1.3 Calculation of eigenvalues 6.1.4 Thermodynamic functions 6.1.5 Concluding remarks 6.2 Series Expansions 6.2.1 High-temperature expansions 6.2.2 Low-temperature expansions 6.2.3 Analysis of series 6.3 Scaling 6.3.1 Thermodynamic considerations 6.3.2 Scaling hypothesis 6.3.3 Kadanoff block spins 6.4 Finite-Size Scaling 6.5 Universality 6.6 Kosterlitz-Thouless Transition 6.7 Problems

7 Critical Phenomena II: The Renormalization Group 7.1 The Ising Chain Revisited 7.2 Fixed Points 7.3 An Exactly Solvable Model: Ising Spins on a Diamond Fractal 7.4 Position Space Renormalization: Cumulant Method 7.4.1 First-order approximation 7.4.2 Second-order approximation 7.5 Other Position Space Renormalization Group Methods 7.5.1 Finite lattice methods 7.5.2 Adsorbed monolayers: Ising antiferromagnet 7.5.3 Monte Carlo renormalization 7.6 Phenomenological Renormalization Group 7.7 The ϵ -Expansion 7.7.1 The Gaussian model 7.7.2 The S_4 model 7.7.3 Conclusion Appendix: Second Order Cumulant Expansion 7.8 Problems

8 Stochastic Processes 8.1 Markov Processes and the Master Equation 8.2 Birth and Death Processes 8.3 Branching Processes 8.4 Fokker-Planck Equation 8.5 Fokker-Planck Equation with Several Variables: SIR Model 8.6 Jump Moments for Continuous Variables 8.6.1 Brownian motion 8.6.2 Rayleigh and Kramers equations 8.7 Diffusion, First Passage and Escape 8.7.1 Natural boundaries: The Kimura-Weiss model for genetic drift 8.7.2 Artificial boundaries 8.7.3 First passage time and escape probability 8.7.4 Kramers escape rate 8.8 Transformations of the Fokker-Planck Equation 8.8.1 Heterogeneous diffusion 8.8.2 Transformation to the Schrödinger equation 8.9 Problems

9 Simulations 9.1 Molecular Dynamics 9.1.1 Conservative molecular dynamics 9.1.2 Brownian dynamics 9.1.3 Data analysis 9.2 Monte Carlo Method 9.2.1 Discrete time Markov processes 9.2.2 Detailed balance and the Metropolis algorithm 9.2.3 Histogram methods 9.3 Data Analysis 9.3.1 Fluctuations 10

10 Polymers and Membranes 11 Quantum Fluids 12 Linear Response Theory 13 Disordered Systems

章节摘录

插图：The case of melting of two-dimensional crystals is considerably more complicated. We first note that it is important, in physisorbed materials, to distinguish between lattice gases and floating monolayers. An example of a lattice gas (helium adsorbed onto the basal plane of graphite) is discussed in Section 7.5.2. In such a system the adsorbed layer does not have a continuous translational symmetry. To first approximation, the atoms occupy discrete sites on the substrate and thermal excitation results in hopping of atoms between eligible sites. Such lattice gases have conventional long-range order below the critical point.

<<平衡态统计物理学>>

编辑推荐

《平衡态统计物理学(第3版)》是由世界图书出版公司出版的。

<<平衡态统计物理学>>

版权说明

本站所提供下载的PDF图书仅提供预览和简介，请支持正版图书。

更多资源请访问:<http://www.tushu007.com>