

## <<凝聚态物理学中的量子场论>>

### 图书基本信息

书名：<<凝聚态物理学中的量子场论>>

13位ISBN编号：9787510024054

10位ISBN编号：7510024056

出版时间：2010-8

出版人：世界图书出版公司

作者：[日] 永長直人（Naoto Nagaosa）

页数：206

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>

## <<凝聚态物理学中的量子场论>>

### 前言

Why is quantum field theory of condensed matter physics necessary? Condensed matter physics deals with a wide variety of topics, ranging from gas to liquids and solids, as well as plasma, where owing to the interplay between the motions of a tremendous number of electrons and nuclei, rich varieties of physical phenomena occur. Quantum field theory is the most appropriate "language", to describe systems with such a large number of degrees of freedom, and therefore its importance for condensed matter physics is obvious. Indeed, up to now, quantum field theory has been successfully applied to many different topics in condensed matter physics. Recently, quantum field theory has become more and more important in research on the electronic properties of condensed systems, which is the main topic of the present volume. Up to now, the motion of electrons in solids has been successfully described by focusing on one electron and replacing the Coulomb interaction of all the other electrons by a mean field potential. This method is called mean field theory, which made important contributions to the explanation of the electronic structure in solids, and led to the classification of insulators, semiconductors and metals in terms of the band theory. It might be said that also the present achievements in the field of semiconductor technology rely on these foundations. In the mean field approximation, effects that arise due to the correlation of the motions of many particles, cannot be described. It has been treated in a perturbative way under the assumption that its effect is small. However, recently, many systems that cannot be described in this standard way have been discovered, and it became clear that a new world opened its doors. Connected to these new aspects of condensed matter physics, the most fundamental problem of quantum theory - the duality between the particle picture and the wave picture - appeared in a very striking way. This particle-wave duality appears in the framework of many-particle quantum field theory as a canonical conjugate relation between the particle number and the quantum mechanical phase.

## <<凝聚态物理学中的量子场论>>

### 内容概要

Condensed matter physics deals with a wide variety of topics , ranging from gas to liquids and solids , as well as plasma , where owing to the interplay between the motions of a tremendous number of electrons and nuclei , rich varieties of physical phenomena occur. Quantum field theory is the most.

## <<凝聚态物理学中的量子场论>>

### 作者简介

作者：（日本）纳高萨（N.Nagaosa）

## <<凝聚态物理学中的量子场论>>

### 书籍目录

1. Review of Quantum Mechanics and Basic Principles of Field Theory  
1.1 Single-Particle Quantum Mechanics  
1.2 Many-Particle Quantum Mechanics: Second Quantization..  
1.3 The Variation Principle and the Noether Theorem  
1.4 Quantization of the Electromagnetic Field  
2. Quantization with Path Integral Methods  
2.1 Single-Particle Quantum Mechanics and Path Integrals  
2.2 The Path Integral for Bosons  
2.3 The Path Integral for Fermions  
2.4 The Path Integral for the Gauge Field  
2.5 The Path Integral for the Spin System  
3. Symmetry Breaking and Phase Transition  
3.1 Spontaneous Symmetry Breaking  
3.2 The Goldstone Mode  
3.3 Kosterlitz-Thouless Transition  
3.4 Lattice Gauge Theory and the Confinement Problem  
4. Simple Examples for the Application of Field Theory  
4.1 The RPA Theory of a Coulomb Gas  
4.2 The Bogoliubov Theory of Superfluidity  
5. Problems Related to Superconductivity  
5.1 Superconductivity and Path Integrals  
5.2 Macroscopic Quantum Effects and Dissipation: The Josephson Junction  
5.3 The Superconductor-Insulator Phase Transition in Two Dimensions and the Quantum Vortices  
6. Quantum Hall Liquid and the Chern-Simons Gauge Field  
6.1 Two-Dimensional Electron System  
6.2 Effective Theory of a Quantum Hall Liquid  
6.3 The Derivation of the Laughlin Wave Function  
Appendix  
A. Fourier Transformation  
B. Functionals and the Variation Principle  
C. Quantum Statistical Mechanics  
References  
Index

## <<凝聚态物理学中的量子场论>>

### 章节摘录

插图：

## <<凝聚态物理学中的量子场论>>

### 编辑推荐

《凝聚态物理学中的量子场论》是由世界图书出版公司出版的。

<<凝聚态物理学中的量子场论>>

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>