

<<有限温度场论原理和应用>>

图书基本信息

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内容概要

what happens when ordinary matter is so greatly compressed that the electrons form a relativistic degenerate gas, as in a white dwarf star? what happens when the matter is compressed even further so that atomic nuclei overlap to form superdense nuclear matter, as in a neutron star? what happens when nuclear matter is heated to such great temperatures that the nucleons and pions melt into quarks and gluons, as in high-energy nuclear collisions? what happened in the spontaneous symmetry break-ing of the unified theory of the weak and electromagnetic interactions during the big bang? questions like these have fascinated us for a long time. the purpose of this book is to develop the fundamental principles and mathematical techniques that enable the formulation of answers to these mind-boggling questions. the study of matter under extreme con-ditions has blossomed into a field of intense interdisciplinary activity and global extent. the analysis of the collective behavior of interacting rela-tivistic systems spans a rich palette of physical phenomena. one of the ultimate goals of the whole program is to map out the phase diagram of the standard model and its extensions.

this text assumes that the reader has completed graduate level courses in thermal and statistical physics and in relativistic quantum field theory.our aims are to convey a coherent picture of the field and to prepare the reader to read and understand the original and current literature. the book is not, however, a compendium of all known results; this would havemade it prohibitively long. we start from the basic principles of quantumfield theory, thermodynamics, and statistical mechanics. this develop-ment is most elegantly accomplished by means of feynman's functionalintegral formalism. having a functional integral expression for the parti-tion function allows a straightforward derivation of diagrammatic rules for interacting field theories. it also provides a framework for defining gauge theories on finite lattices, which then enables integration by monte carlo techniques. the formal aspects are illustrated with applications drawn from fields of research that are close to the authors' own experience. eachchapter carries its own exercises, reference list, and select bibliography.the book is based on finite-temperature field theory, written by one of us (jk) and published in 1989. although the fundamental principles have not changed, there have been many important developments since then, necessitating a new book.

<<有限温度场论原理和应用>>

书籍目录

- preface
- 1 review of quantum statistical mechanics
 - 1.1 ensembles
 - 1.2 one bosonic degree of freedom
 - 1.3 one fermionic-degree of freedom
 - 1.4 noninteracting gases
 - 1.5 exercises
- bibliography
- 2 functional integral representation of the partition function
 - 2.1 transition amplitude for bosons
 - 2.2 partition function for bosons
 - 2.3 neutral scalar field
 - 2.4 bose-einstein condensation
 - 2.5 fermions
 - 2.6 remarks on functional integrals
 - 2.7 exercises
- reference
- bibliography
- 3 interactions and diagrammatic techniques
 - 3.1 perturbation expansion
 - 3.2 diagrammatic rules for ϕ^4 theory
 - 3.3 propagators
 - 3.4 first-order corrections to Π and $\ln Z$
 - 3.5 summation of infrared divergences
 - 3.6 yukawa theory
 - 3.7 remarks on real time perturbation theory
 - 3.8 exercises
- references
- bibliography
- 4 renormalization
 - 4.1 renormalizing ϕ^4 theory
 - 4.2 renormalization group
 - 4.3 regularization schemes
 - 4.4 application to the partition function
 - 4.5 exercises
- references
- bibliography
- 5 quantum electrodynamics
 - 5.1 quantizing the electromagnetic field
 - 5.2 blackbody radiation
 - 5.3 diagrammatic expansion
 - 5.4 photon self-energy
 - 5.5 loop corrections to $\ln Z$
 - 5.6 exercises
- references

<<有限温度场论原理和应用>>

bibliography

6 linear response theory

- 6.1 linear response to an external field
- 6.2 lemann representation
- 6.3 screening of static electric fields
- 6.4 screening of a point charge
- 6.5 exact formula for screening length in qed
- 6.6 collective excitations
- 6.7 photon dispersion relation
- 6.8 electron dispersion relation
- 6.9 kubo formulae for viscosities and conductivities
- 6.10 exercises

references

bibliography

7 spontaneous symmetry breaking and restoration

- 7.1 charged scalar field with negative mass-squared
- 7.2 goldstone's theorem
- 7.3 loop corrections
- 7.4 higgs model
- 7.5 exercises

references

bibliography

8 quantum chromodynamics

- 8.1 quarks and gluons
- 8.2 asymptotic freedom
- 8.3 perturbative evaluation of partition function
- 8.4 higher orders at finite temperature
- 8.5 gluon propagator and linear response
- 8.6 instantons
- 8.7 infrared problems
- 8.8 strange quark matter
- 8.9 color superconductivity
- 8.10 exercises

references

bibliography

9 resummation and hard thermal loops

- 9.1 isolating the hard thermal loop contribution
- 9.2 hard thermal loops and ward identities
- 9.3 hard thermal loops and effective perturbation theory
- 9.4 spectral densities
- 9.5 kinetic theory
- 9.6 transport coefficients
- 9.7 exercises

references

10 lattice gauge theory

- 10.1 abelian gauge theory
- 10.2 nonabelian gauge theory

<<有限温度场论原理和应用>>

10.3 fermions

10.4 phase transitions in pure gauge theory

10.5 lattice qcd

10.6 exercises

references

bibliography

11 dense nuclear matter

12 hot hadronic matter

13 nucleation theory

14 heavy ion collisions

15 weak interactions

16 astrophysics and cosmology

appendix

index

<<有限温度场论原理和应用>>

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