<<玻色化和强关联系统>>

图书基本信息

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前言

We used to think that if we know one, we knew two, because one and oneare two. We are finding that we must learn a great deal more about and.Sir Arthur Eddington, from The Harvest of a Quiet Eye, by A. MackayThe behaviour of large and complex aggregations of elementary particles,it turns out, is not to be understood in terms of a simple extrapolation ofthe properties of a few particles. Instead, at each level of complexity entirelynew properties appear, and the understanding of the new behaviours requiresresearch which I think is as fundamental in its nature as any other.E W. Anderson, from More is Different （1972） High energy physics continues to fascinate people inside and outside ofscience, being perceived as the 'most fundamental' area of research. Itis believed somehow that the deeper inside the matter we go the closerwe get to the truth. So it is believed that 'the truth is out there'-athigh energies, small distances, short times. Therefore the ultimate theory,Theory of Everything, must be a theory operating at the smallest distancesand times possible where there is no difference between gravitational andall other forces （the Planck scale） . All this looks extremely revolutionaryand complicated, but once a condensed matter physicist has found timeand courage to acquaint himself with these ideas and theories, thesewould not appear to him utterly unfamiliar. Moreover, despite the factthat the two branches of physics study objects of vastly different sizes,the deeper into details you go, the more parallels you will find betweenthe concepts used. In many cases the only difference is that models arecalled by different names, but this has more to do with funding than withthe essence.

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内容概要

Technical aspects of bosonization、A simple case of Bose-Fermi equivalence: Jordan-Wigner、Transformation、One-dimensional fermion States near the Fermi points、Chiral anomaly、Anomalous commutators、Ganssian model. Lagrangian formulation、Bosonization、Interaction with an electromagnetic field; gauge invariance、Conformal symmetry and finite size effects、Gaussian model in the Hamiltonian formulation、Virasoro algebra、Ward identities等等。

作者简介

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书籍目录

PrefaceAcknowledgementsPart Ⅰ: Technical aspects of bosonization A simple case of Bose-Fermi equivalence: Jordan-Wigner transformation One-dimensional fermion tates near the Fermi points Chiral anomaly Anomalous commutators Ganssian model. Lagrangian formulation Bosonization Interaction with an electromagnetic field; gauge invariance Conformal symmetry and finite size effects Gaussian model in the Hamiltonian formulation Virasoro algebra Ward identities Subalgebra sl(2) Structure of Hilhert space in conformal theories Differential equations for correlation functions Dotsenko——Fateev bosonization scheme for the minimal models Current (Kac-Moody) algebras; the first assault Sugawara Hamiltonian for Wess-Zumino-Novikov-Witten model Knizhnik-Zamolodchikov (KZ) equations Relevant and irrelevant fields Bose-Einstein Condensation in two dimensions; Beresinskii- Kesterlitz-Thouless transition The sine-Gordon model The renormalization group analysis Exact solution of the sine-Gordon model Spin S-1/2 Heisenberg-lsing chain Explicit expression for the dynamical magnetic susceptibility Ising model More about the WZNW model Special cases 1.1 SU1(2) WZNW model as a Gaussian model 1.2 SU2(2) WZNW model and the Ising model 1.3 SU4(2) as a theory of two bosonic fields 1.4 SUI0(2) as a theory of three bosonic fields Deformation of the WZNW model and coset constructions Non-Abelian bosznization WZNW model in the Lagrangian formulation Derivation of the Lagrangian Calculation of a nontrivial determinantPart Ⅱ: Application of the bosonization technique to physical Part III Singleimpurityproblems

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章节摘录

插图：This volume provides a detailed account of bosonization. This important tech-nique represents one of the most powerful nonperturbative approaches to many-body systems currently available. The first part of the book examines the technical aspects of bosonization. Topicsinclude one-dimensional fermions, the Gaussian model, the structure of Hilbertspace in conformal theories, Bose-Einstein condensation in two dimensions, non-Abelian bosonization, and the Ising and WZNW models. The second partpresents applications of the bosonization technique to realistic models includingthe Tomonaga-Luttinger liquid, spin liquids in one dimension and the spin-1/2 Heisenberg chain with alternative exchange. The third part addresses theproblems of quantum impurities. Chapters cover potential scattering, the X-rayedge problem, impurities in Tomonaga-Luttinger liquids and the multi-channelKondo problem. This book will be an excellent reference for researchers andgraduate students working in theoretical physics, condensed matter physics andfield theory.

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