

<<夸克、轻子和规范场>>

图书基本信息

书名：<<夸克、轻子和规范场>>

13位ISBN编号：9787506291750

10位ISBN编号：7506291754

出版时间：2009-1

出版时间：世界图书出版公司

作者：[美]黄克逊

页数：333

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

According to the current view, the basic building blocks of matter are quarks and leptons, which interact with one another through the intermediaries of Yang-Mills gauge fields (gravity being ignored in this context). This means that the forms of the interactions are completely determined by the algebraic structure of certain internal symmetry groups. Thus, the strong interactions are associated with the group $SU(3)$, and is described by a gauge theory called quantum chromodynamics. The electro-weak interactions, as described by the now standard Weinberg-Salam model, is associated with the group $su(2) \times U(1)$. This book is a concise introduction to the physical motivation behind these ideas, and precise mathematical formulation thereof. The goal of the book is to explain why and how the mathematical formalism helps us to understand the relevant observed phenomena. The audience for which this book is written are graduate students in physics who have some knowledge of the experimental parts of particle physics, and an acquaintance with quantum field theory, including Feynman graphs and the notion of renormalization. This book might serve as a text for a one-semester course beyond quantum field theory. The first edition of this book, which came out in 1982, was based on a course I gave at M.I.T., and on lectures I gave in Santiago, Chile, in 1977, and in Beijing, China, in 1979. I am indebted to I. Saavedra for the opportunity to lecture in Chile, to Chang Wen-yu and S.C.C. Ting for the inducement to give the Beijing lecture, and to M. Jacob and K.K. Phua for the encouragement to bring out the first edition. The main addition to the second edition are Wilson's approach to renormalization, lattice gauge theory, and quark confinement. I am grateful to the many readers who have pointed out errors in the first edition, which I hope have been corrected in this edition. I owe special thanks to my colleagues at M.I.T., especially A. Guth, R. Jackiw, K. Johnson, and J. Polonyi, from whom I have learned much that is being passed along in this book.

<<夸克、轻子和规范场>>

内容概要

依据通行的观点，物质的基本砌块是夸克与轻子，它们通过杨-米尔斯规范场的媒介相互作用(在这种场合下引力被忽略了)。

这就意味着相互作用的形式是完全由某些内部对称群的代数结构所决定的。

于是强相互作用是与SU(3)群相关联的，它是由叫做量子色动力学的规范场理论所描述的。

而电-弱相互作用则是与SU(2)XU(1)群相关联的，现在它是由标准的温伯格-萨拉姆模型来描述的。

本书简明地介绍了在这些思想背后的动力，以及由此而来的严谨的数学系统表述。

<<夸克、轻子和规范场>>

作者简介

作者：(美国)黄克逊

<<夸克、轻子和规范场>>

书籍目录

PREFACE .INTRODUCTION 1.1 Particles and Interactions 1.2 Gauge Theories of Interactions 1.3 Notations and Conventions .QUARKS 2.1 Internal Symmetries 1 Isospin 2 The gauge groups 3 More general internal symmetries: SU(n) 4 Unitary symmetry 2.2 Representation of SU(3) 1 The basic representation 2 Young's tableaux 3 Irreducible representations 2.3 The Quark Model 1 Quarks as basic triplets 2 Quarks as building blocks 3 Weight diagrams 4 The composition of hadrons 2.4 Color 1 Independent quark model 2 Color SU(3) group 2.5 Electromagnetic and Weak Probes 1 Electromagnetic interactions 2 Parton model 3 Evidence for color 4 Weak interactions 2.6 Charm 1 The charmed quark 2 The J/ψ and its family 3 Correspondence between quarks and leptons .MAXWELL FIELD: U(1) GAUGE THEORY 3.1 Global and Local Gauge Invariance 3.2 Spontaneous Breaking of Global Gauge Invariance: Goldstone Mode 3.3 Spontaneous Breaking of Local Gauge Invariance: Higgs Mode 3.4 Classical Finite-Energy Solutions 3.5 Magnetic Flux Quantization 3.6 Soliton Solutions: Vortex Lines . YANG-MILLS FIELDS: NON-ABELIAN GAUGE THEORIES 4.1 Introductory Note 4.2 Lie Groups 1 Structure constants 2 Matrix representations 3 Topological properties 4 General remarks 4.3 The Yang-Mills Constructions 1 Global gauge invariance 2 Local gauge invariance 4.4 Properties of Yang-Mills Fields 1 Electric and magnetic fields 2 Dual tensor 3 Path representation of the gauge group 4.5 Canonical Formalism 1 Equations of motion 2 Hamiltonian 4.6 Spontaneous Symmetry Breaking 1 The little group 2 Higgs mechanism .TOPOLOGICAL SOLITONS 5.1 Solitons 5.2 The Instanton 1 Topological charge 2 Explicit solution 5.3 The Monopole 1 Topological stability 2 Flux quantization 3 Boundary conditions 4 Explicit solution 5 Physical fields 6 Spin from isospin .WEINBERG-SALAM MODEL 6.1 The Matter Fields 6.2 The Gauge Fields 1 Gauging $SU(2) \times U(1)$ 2 Determination of constants 3 Interactions 6.3 The General Theory 1 Mass terms 2 Cabibbo angle 3 Kobayashi-Maskawa matrix 4 Solitons .METHOD OF PATH INTEGRALS 7.1 Non-Relativistic Quantum Mechanics 7.2 Quantum Field Theory 7.3 External Sources 7.4 Euclidean 4-Space 7.5 Calculation of Path Integrals 7.6 The Feynman Propagator 7.7 Feynman Graphs 7.8 Boson Loops and Fermion Loops 7.9 Fermion Fields .QUANTIZATION OF GAUGE FIELDS 8.1 Canonical Quantization 1 Free Maxwell field 2 Pure Yang-Mills fields 8.2 Path Integral Method in Hamiltonian Form 8.3 Feynman Path Integral: Fadeev-Popov Method 8.4 Free Maxwell Field 1 Lorentz gauge 2 Coulomb gauge 3 Temporal and axial gauges 8.5 Pure Yang-Mills Fields 1 Axial gauge 2 Lorentz gauge: Fadeev-Popov ghosts 8.6 The 0-World and the Instanton 1 Discovering the 0-world 2 Instanton as tunneling solution 3 The 0-action 8.7 Gribov Ambiguity 8.8 Projection Operator for Gauss' Law .RENORMALIZATION 9.1 Charge Renormalization 9.2 Perturbative Renormalization in Quantum Electrodynamics 9.3 The Renormalization Group 1 Scale transformations 2 Scaling form 3 Fixed points 4 Callan-Symanzik equation 9.4 Scalar Fields 1 Renormalizability 2 4 theory 3 "Triviality" and the Landau ghost 9.5 The Physics of Renormalization 1 Renormalization-group transformation 2 Real-space renormalization 3 Fixed points and relevancy 4 Renormalization and universality Appendix to Chapter 9. Renormalization of QED 1 Vertex 2 Electron Propagator 3 Photon Propagator 4 Scaling Properties 5 Renormalization 6 Gauge Invariance and the Photon Mass .METHOD OF EFFECTIVE POTENTIAL 10.1 Spontaneous Symmetry Breaking 10.2 The Effective Action 10.3 The Effective Potential 10.4 The Loop Expansion 10.5 One-Loop Effective Potential 10.6 Renormalization 1 General scheme 2 Massive case 3 Massless case 10.7 Dimensional Transmutation 10.8 A Non-Relativistic Example 10.9 Application to Weinberg-Salam Model . THE AXIAL ANOMALY 11.1 Origin of the Axial Anomaly 11.2 The Triangle Graph 11.3 Anomalous Divergence of the Chiral Current 11.4 Physical Explanation of the Axial Anomaly 11.5 Cancellation of Anomalies 11.6 't Hooft's Principle . QUANTUM CHROMODYNAMICS 12.1 General Properties 1 Lagrangian density 2 Feynman rules 3 Quark-gluon interactions 4 Gluon self-interactions 12.2 The Color Gyromagnetic Ratio 12.3 Asymptotic Freedom 1 The running coupling constant 2 The vacuum as magnetic medium 3 The Nielsen-Hughes formula 12.4 The Pion as Goldstone Boson 1 The low-energy domain 2 Chiral symmetry: an idealized limit 3 PCAC 4 The decay $\pi^0 \rightarrow \gamma\gamma$ 5 Extension to pion octet 12.5

<<夸克、轻子和规范场>>

The U(1) Puzzle 12.6 -Worlds in QCD 1 Euclidean action 2 The axial anomaly and the index theorem 3
Chiral limit: Collapse of the 0-worlds 4 Quark mass matrix 5 Strong CP violation . LATTICE GAUGE
THEORY 13.1 Wilson's Lattice Action 13.2 Transfer Matrix 13.3 Lattice Hamiltonian 13.4 Lattice Fermions 13.5
Wilson Loop and Confinement 13.6 Continuum Limit 13.7 Monte Carlo Methods . QUARK
CONFINEMENT 14.1 Wilson Criterion and Electric Confinement 14.2 String Model of Hadrons 14.3
Superconductivity: Magnetic Confinement 1 Experimental manifestation 2 Theory 3 Mechanism for
monopole confinement 14.4 Electric and Magnetic Order Parameters 14.5 Scenario for Quark Confinement
Appendix to Chapter 14.Symmetry and Confinement 1 Quark Propagator 2 Center Symmetry 3 Confinement
as SymmetryINDEX

<<夸克、轻子和规范场>>

章节摘录

插图：

<<夸克、轻子和规范场>>

编辑推荐

《夸克、轻子和规范场(第2版)》是由世界图书出版公司出版的。

<<夸克、轻子和规范场>>

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>