

<<粒子物理学标准模型导论>>

图书基本信息

书名：<<粒子物理学标准模型导论>>

13位ISBN编号：9787510005541

10位ISBN编号：751000554X

出版时间：2010-4

出版公司：世界图书出版公司

作者：（英）考汀汉姆 著

页数：272

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

In the eight years since the first edition, the Standard Model has not been seriously discredited as a description of particle physics in the energy region ($[2 \text{ TeV}]$) so far explored. The principal discovery in particle physics since the first edition is that neutrinos carry mass. In this new edition we have added chapters that extend the formalism of the Standard Model to include neutrino fields with mass, and we consider also the possibility that neutrinos are Majorana particles rather than Dirac particles. The Large Hadron Collider (LHC) is now under construction at CERN. It is expected that, at the energies that will become available for experiments at the LHC ($\sim 20 \text{ TeV}$), the physics of the Higgs field will be elucidated, and we shall begin to see 'physics beyond the Standard Model'. Data from the 'B factories' will continue to accumulate and give greater understanding of CP violation. We are confident that interest in the Standard Model will be maintained for some time into the future. Cambridge University Press have again been most helpful. We thank Miss V. K. Johnson for secretarial assistance. We are grateful to Professor Dr J. G. Körner for his corrections to the first edition, and to Professor C. Davies for her helpful correspondence.

<<粒子物理学标准模型导论>>

内容概要

本书从介子和夸克的电磁作用和弱相互作用开始，讲到了夸克的强相互作用，内容层层深入。介绍标准模型的同时，作者非常注重选材的可进阶性，方便读者更深入的研读。

<<粒子物理学标准模型导论>>

书籍目录

Preface to the second edition Preface to the first edition Notation

1 The particle physicist's view of Nature 1.1 Introduction 1.2 The construction of the Standard Model 1.3 Leptons 1.4 Quarks and systems of quarks 1.5 Spectroscopy of systems of light quarks 1.6 More quarks 1.7 Quark colour 1.8 Electron scattering from nucleons 1.9 Particle accelerators 1.10 Units

2 Lorentz transformations 2.1 Rotations, boosts and proper Lorentz transformations 2.2 Scalars, contravariant and covariant four-vectors 2.3 Fields 2.4 The Levi-Civita tensor 2.5 Time reversal and space inversion

3 The Lagrangian formulation of mechanics 3.1 Hamilton's principle 3.2 Conservation of energy 3.3 Continuous systems 3.4 A Lorentz covariant field theory 3.5 The Klein-Gordon equation 3.6 The energy-momentum tensor 3.7 Complex scalar fields

4 Classical electromagnetism 4.1 Maxwell's equations 4.2 A Lagrangian density for electromagnetism 4.3 Gauge transformations 4.4 Solutions of Maxwell's equations 4.5 Space inversion 4.6 Charge conjugation 4.7 Intrinsic angular momentum of the photon 4.8 The energy density of the electromagnetic field 4.9 Massive vector fields

5 The Dirac equation and the Dirac field 5.1 The Dirac equation 5.2 Lorentz transformations and Lorentz invariance 5.3 The parity transformation 5.4 Spinors 5.5 The matrices 5.6 Making the Lagrangian density real

6 Free space solutions of the Dirac equation 6.1 A Dirac particle at rest 6.2 The intrinsic spin of a Dirac particle 6.3 Plane waves and helicity 6.4 Negative energy solutions 6.5 The energy and momentum of the Dirac field 6.6 Dirac and Majorana fields 6.7 The $E \gg m$ limit, neutrinos

7 Electrodynamics 7.1 Probability density and probability current 7.2 The Dirac equation with an electromagnetic field 7.3 Gauge transformations and symmetry 7.4 Charge conjugation 7.5 The electrodynamics of a charged scalar field 7.6 Particles at low energies and the Dirac magnetic moment

8 Quantising fields: QED 8.1 Boson and fermion field quantisation 8.2 Time dependence 8.3 Perturbation theory 8.4 Renormalisation and renormalisable field theories 8.5 The magnetic moment of the electron 8.6 Quantisation in the Standard Model

9 The weak interaction: low energy phenomenology 9.1 Nuclear beta decay 9.2 Pion decay 9.3 Conservation of lepton number 9.4 Muon decay 9.5 The interactions of muon neutrinos with electrons

10 Symmetry breaking in model theories 10.1 Global symmetry breaking and Goldstone bosons 10.2 Local symmetry breaking and the Higgs boson

11 Massive gauge fields 11.1 SU(2) symmetry 11.2 The gauge fields 11.3 Breaking the SU(2) symmetry 11.4 Identification of the fields

12 The Weinberg—Salam electroweak theory for leptons 12.1 Lepton doublets and the Weinberg-Salam theory 12.2 Lepton coupling to the W 12.3 Lepton coupling to the Z 12.4 Conservation of lepton number and conservation of charge 12.5 CP symmetry 12.6 Mass terms in : an attempted generalisation

13 Experimental tests of the Weinberg—Salam theory 13.1 The search for the gauge bosons 13.2 The W bosons 13.3 The Z boson 13.4 The number of lepton families 13.5 The measurement of partial widths 13.6 Left-right production cross-section asymmetry and lepton decay symmetry of the Z boson

14 The electromagnetic and weak interactions of quarks 14.1 Construction of the Lagrangian density 14.2 Quark masses and the Kobayashi-Maskawa mixing matrix 14.3 The parameterisation of the KM matrix 14.4 CP symmetry and the KM matrix 14.5 The weak interaction in the low energy limit

15 The hadronic decays of the Z and W bosons 15.1 Hadronic decays of the Z 15.2 Asymmetry in quark production 15.3 Hadronic decays of the W

16 The theory of strong interactions: quantum chromodynamics 16.1 A local SU(3) gauge theory 16.2 Colour gauge transformations on baryons and mesons 16.3 Lattice QCD and asymptotic freedom 16.4 The quark-antiquark interaction at short distances 16.5 The conservation of quarks 16.6 Isospin symmetry 16.7 Chiral symmetry

17 Quantum chromodynamics: calculations 17.1 Lattice QCD and confinement 17.2 Lattice QCD and hadrons 17.3 Perturbative QCD and deep inelastic scattering 17.4 Perturbative QCD and e+e- collider physics

18 The Kobayashi-Maskawa matrix 18.1 Leptonic weak decays of hadrons 18.2 $|V_{ud}|$ and nuclear decay 18.3 More leptonic decays 18.4 CP symmetry violation in neutral kaon decays 18.5 B meson decays and B,B mixing 18.6 The CPT theorem

章节摘录

插图：5、The Dirac equation and the Dirac field
The Standard Model is a quantum field theory . In Chapter 4 we discussed the classical electromagnetic field . The transition to a quantum field will be made in Chapter 8 . In this chapter we begin our discussion of the Dirac equation , which was invented by Dirac as an equation for the relativistic quantum wave function of a single electron . However, we shall regard the Dirac wave function as a field . Which will subsequently be quantised along with the electromagnetic field . The Dirac equation will be regarded as a field equation . The transition to a quantum field theory is called second quantisation . The field,

like the Dirac wave function . is complex . We shall show how the Dirac field transforms under a Lorentz transformation . And find a Lorentz invariant Lagrangian from which it may be derived . On quantisation , the electromagnetic fields $A(x)$, $F(x)$ become space-and time . dependent operators . The expectation values of these operators in the environment described by the quantum states are the classical fields . The Dirac fields $\psi(x)$ also become space-and time . dependent operators on quantisation . However, there are no corresponding measurable classical fields . This difference reflects the Pauli exclusion principle , which applies to fermions but not to bosons . In this chapter and in the following two chapters , the properties of the Dirac fields as operators are rarely invoked : for the most part the manipulations proceed as if the Dirac fields were ordinary complex functions , and the fields can be thought of as single-particle Dirac wave functions .

5 . 1 The Dirac equation
Dirac invented his equation in seeking to make Schrödinger's equation for an electron compatible with special relativity .

<<粒子物理学标准模型导论>>

编辑推荐

《粒子物理学标准模型导论(第2版)》由世界图书出版公司出版。

<<粒子物理学标准模型导论>>

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>