<<粒子物理概念>>

图书基本信息

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内容概要

The last thirty years have seen an enormous advance in our understanding of the microscopic world. We now have a convincing picture of the fundamental struc-ture of observable matter in terms of certain point-like elementary particles. We also have a comprehensive theory describing the behaviour of and the forces between these elementary particles, which we believe provides a complete and correct description of nearly all non-gravitational physics. Matter, so it seems, consists of just two types of elementary particles: quarks and leptons. These are the fundamental building blocks of the material world, out of which we ourselves are made. The theory describ-ing the microscopic behaviour of these particles has,over the past decade or so, become known as the 'Standard Model', providing as it does an accurate account of the force of electromagnetism, the weak nuclear force （responsible for radioactive decay）, and the strong nuclear force （which holds atomic nuclei together）. The Standard Model has been remarkably successful; upuntil a year or two ago all experimental tests have verified the detailed predictions of the theory. The Standard Model is based on the principle of 'gauge symmetry', which asserts that the properties and interactions of elementary particles are governed by certain fundamental symmetries related to familiar conservation laws.

作者简介

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书籍目录

章节摘录

版权页：插图：In order to understand the weak interaction in greater depth, we need to first delve further into the properties of relativistic fermions. In Section 4.2,we Jeamt that relativistic fermions are described by two-component spinors （with another two-component spinor for the antiparticle）. In the Newtonian limit,when fermions move slowly, these two components can be interpreted as the two spin states of the fermion: the fermion can either be spin-up or spin-down. However,when the fermions are moving close to the speed of light, the notion of spin is no longer so useful and we need a new way in which to classify the two fermion states. In turns out that there are two useful ways to do this. The first, which is closely related to spin, is to define the helicity as the component of the fermion's spin in the direction of motion of the fermion. The spin can either be aligned with or against the momentum, and the fermion is referred to as being in the helicity-plus or helicity-minus state respectively.

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