

<<标准模型动力学>>

图书基本信息

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前言

The Standard Model lagrangian LSM embodies our knowledge of the strong and electroweak interactions. It contains as fundamental degrees of freedom the spin one-half quarks and leptons, the spin one gauge bosons, and the spin zero Higgs fields. Symmetry plays the central role in determining its dynamical structure. The lagrangian exhibits invariance under $SU(3)$ gauge transformations for the strong interactions and under $SU(2) \times U(1)$ gauge transformations for the electroweak interactions. Despite the presence of (all too) many input parameters, it is a mathematical construction of considerable predictive power. There are several books available which describe in detail the construction of LSM and its quantization, and which deal with aspects of symmetry breaking. We felt the need for a book describing the next steps, how LSM is connected to the observable physics of the real world. There are a considerable variety of techniques, of differing rigor, which are used by particle physicists to accomplish this. We present here those which have become indispensable tools. In addition, we attempt to convey the insights and 'conventional wisdom' which have been developed throughout the field. This book can only be an introduction to the riches contained in the subject, hopefully providing a foundation and a motivation for further exploration by its readers.

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内容概要

This book describes the practical techniques for connecting the phenomenology of particle physics with the accepted modern theory known as the 'Standard Model'. The Standard Model of elementary particle interactions is the outstanding achievement of the past forty years of experimental and theoretical activity in particle physics. This book gives a detailed account of the Standard Model, focussing on the techniques by which the model can produce information about real observed phenomena. The text opens with a pedagogic account of the theory of the Standard Model. Introductions to the essential calculation techniques needed, including effective lagrangian techniques and path integral methods, are included. The major part of the text is concerned with the use of the Standard Model in the calculation of physical properties of particles. Rigorous and reliable methods (radiative corrections and nonperturbative techniques based on symmetries and anomalies) are emphasized, but other useful models (such as the quark and Skyrme models) are also described. The strong and electroweak interactions are not treated as independent threads, but rather are woven together into a unified phenomenological fabric. Many exercises and diagrams are included.

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