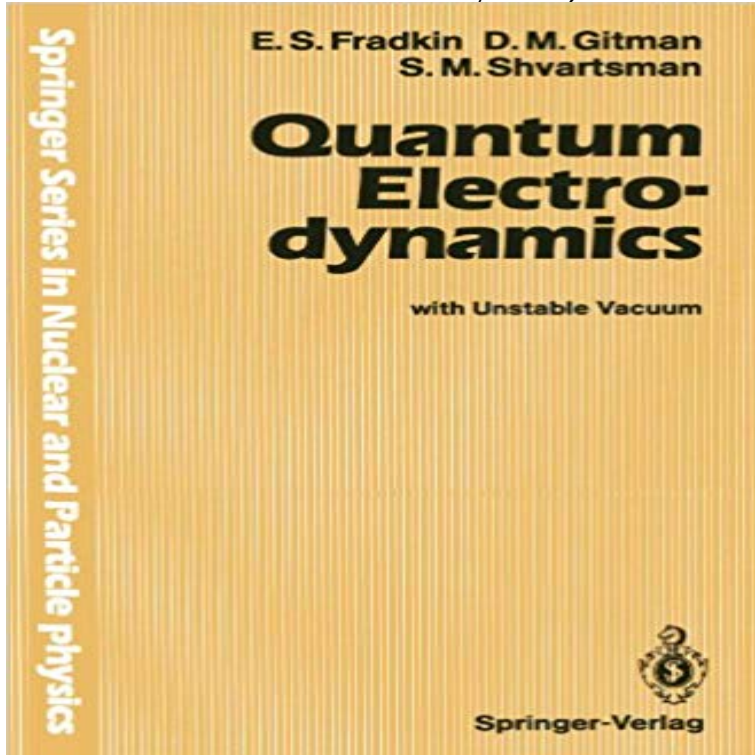


## Quantum Electrodynamics: with Unstable Vacuum (Springer Series in Nuclear and Particle Physics)



This book contains a systematic analysis of the formalisms of quantum electrodynamics in the presence of an intense external field able to create pairs from the vacuum, and thereby violate the stability of the latter. The approach developed is not specific to quantum electrodynamics, and can equally well be applied to any quantum field theory with an unstable vacuum. It should be noted that only macroscopic external fields are considered, whereas problems associated with the superstrong Coulomb (micro) field are not treated. As a rule, the discussion is confined to those details of the formalism and calculations that are specific to the instability property. For instance, renormalization is not discussed here since, in practical calculations, it is carried out according to standard methods. The presentation is based mainly on original research undertaken by the authors. Chapter 1 contains a general introduction to the problem. It also presents some standard information on quantum electrodynamics, which will be used later in the text. In addition, an interpretation of the concept of an external field is given, and the problems that arise when one tries to keep the interaction with the external field exactly are discussed. In Chapter 2, the perturbation expansion in powers of the radiative interaction is developed for the matrix elements of transition processes, taking the arbitrary external field into account exactly.

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