



# Lectures of Quantum Field Theory

By Ashok Das

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## Lectures of Quantum Field Theory By Ashok Das

This book consists of the lectures for a two-semester course on quantum field theory, and as such is presented in a quite informal and personal manner. The course starts with relativistic one-particle systems, and develops the basics of quantum field theory with an analysis of the representations of the Poincaré group. Canonical quantization is carried out for scalar, fermion, Abelian and non-Abelian gauge theories. Covariant quantization of gauge theories is also carried out with a detailed description of the BRST symmetry. The Higgs phenomenon and the standard model of electroweak interactions are also developed systematically. Regularization and (BPHZ) renormalization of field theories as well as gauge theories are discussed in detail, leading to a derivation of the renormalization group equation. In addition, two chapters -- one on the Dirac quantization of constrained systems and another on discrete symmetries -- are included for completeness, although these are not covered in the two-semester course.

**Contents:** Relativistic Equations; Solutions of the Dirac Equation; Properties of the Dirac Equation; Representations of Lorentz and Poincaré Groups; Free Klein Gordon Field Theory; Self-Interacting Scalar Field Theory; Complex Scalar Field Theory; Dirac Field Theory; Maxwell Field Theory; Dirac Method for Constrained Systems; Discrete Symmetries; Yang Mills Theory; BRST Invariance and Its Consequences; Higgs Phenomenon and the Standard Model; Regularization of Feynman Diagrams; Renormalization Theory; Renormalization Group and Equation.

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#### **Review**

This new Quantum Field Theory (QFT) book by Professor Ashok Das is a very complete introductory book on the subject. It is ideal for a graduate class that has taken two semesters of Quantum Mechanics and starting the QFT course ... There are lucid discussions of topics such as Dirac quantization method which is missing in most QFT books as well as discussions of Yang-Mills theories, BRST, methods and renormalization group equations needed for appreciating the latest developments leading to the standard model ... This truly outstanding book fills a long standing gap in the field and presents the material at just the right level for a beginning course. I recommend it very highly to anyone learning Quantum Field Theory. -- Professor R N Mohapatra, University of Maryland

Ashok Das has written an excellent, comprehensive introduction to modern quantum field theory, covering both its theoretical underpinnings and basic computational methods. It will be very useful to students, teachers, and researchers as a course text, and as a volume for self-study and reference. --Professor Stephen L Adler, Institute for Advanced Study, Princeton

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