



Gauge Theories in Particle Physics: A Practical Introduction, Volume 1: From Relativistic Quantum Mechanics to QED, Fourth Edition

Ian J R Aitchison, Anthony J.G. Hey

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Volume 1 of this revised and updated edition provides an accessible and practical introduction to the first gauge theory included in the Standard Model of particle physics: quantum electrodynamics (QED).

The book includes self-contained presentations of electromagnetism as a gauge theory as well as relativistic quantum mechanics. It provides a unique elementary introduction to quantum field theory, establishing the essentials of the formal and conceptual framework upon which the subsequent development of the three gauge theories is based. The text also describes tree-level calculations of physical processes in QED and introduces ideas of renormalization in the context of one-loop radiative corrections for QED.

New to the Fourth Edition

- New chapter on Lorentz transformations and discrete symmetries in relativistic quantum mechanics, with physical applications
- Introduction of Majorana fermions at an early stage, making the material suitable for a first course in relativistic quantum mechanics
- Discrete symmetries in quantum field theory
- Updates on nucleon structure functions and the status of QED

The authors discuss the main conceptual points of the theory, detail many practical calculations of physical quantities from first principles, and compare these quantitative predictions with experimental results, helping readers improve both their calculation skills and physical insight.

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