

1. Record Nr.	UNINA9911020166903321
Autore	Gross Franz
Titolo	Relativistic quantum mechanics and field theory // Franz Gross
Pubbl/distr/stampa	New York, : Wiley, 1999, c1993
ISBN	9786611764357 9781281764355 1281764353 9780471591139 0471591130 9783527617333 3527617337 9783527617340 3527617345
Edizione	[Wiley science paperback ed.]
Descrizione fisica	1 online resource (646 p.)
Collana	Wiley science paperback series
Disciplina	530.12 539.7
Soggetti	Relativistic quantum theory Quantum field theory Symmetry (Physics) Gauge fields (Physics) Teoria quàntica de camps Simetria (Física) Camps de galga (Física) Llibres electrònics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	"Wiley Classics Library Edition published 1999." "A Wiley-Interscience publication."
Nota di bibliografia	Includes bibliographical references (p. 615-618) and index.
Nota di contenuto	Relativistic Quantum Mechanics and Field Theory; CONTENTS; Preface; Part I QUANTUM THEORY OF RADIATION; 1. Quantization of the Nonrelativistic String; 1.1 The one-dimensional classical string; 1.2 Normal modes of the string; 1.3 Quantization of the string; 1.4 Canonical commutation relations; 1.5 The number operator and

phonon states; 1.6 The quanta as particles; 1.7 The classical limit: Field-particle duality; 1.8 Time translation; Problems; 2. Quantization of the Electromagnetic Field; 2.1 Lorentz transformations; 2.2 Relativistic form of Maxwell's theory  
 2.3 Interactions between particles and fields 2.4 Plane wave expansions; 2.5 Massive vector fields; 2.6 Field quantization; 2.7 Spin of the photon; Problems; 3. Interaction of Radiation with Matter; 3.1 Time evolution and the S-matrix; 3.2 Decay rates and cross sections; 3.3 Atomic decay; 3.4 The Lamb shift; 3.5 Deuteron photodisintegration; Problems; Part II RELATIVISTIC EQUATIONS; 4. The Klein-Gordon Equation; 4.1 The equation; 4.2 Conserved norm; 4.3 Solutions for free particles; 4.4 Pair creation from a high Coulomb barrier; 4.5 Two-component form; 4.6 Nonrelativistic limit  
 4.7 Coulomb scattering 4.8 Negative energy states; Problems; 5. The Dirac Equation; 5.1 The equation; 5.2 Conserved norm; 5.3 Solutions for free particles; 5.4 Charge conjugation; 5.5 Coulomb scattering; 5.6 Negative energy states; 5.7 Nonrelativistic limit; 5.8 The Lorentz group; 5.9 Covariance of the Dirac equation; 5.10 Bilinear covariants; 5.11 Chirality and massless fermions; Problems; 6. Application of the Dirac Equation; 6.1 Spherically symmetric potentials; 6.2 Hadronic structure; 6.3 Hydrogen-like atoms; Problems; Part III ELEMENTS OF QUANTUM FIELD THEORY; 7. Second Quantization  
 7.1 Schrodinger theory 7.2 Identical particles; 7.3 Charged Klein-Gordon theory; 7.4 Dirac theory; 7.5 Interactions: An introduction; Problems; 8. Symmetries I; 8.1 Noether's theorem; 8.2 Translations; 8.3 Transformations of states and operators; 8.4 Parity; 8.5 Charge conjugation; 8.6 Time reversal; 8.7 The PCT theorem; Problems; 9. Interacting Field Theories; 9.1  $\phi^3$  theory: An example; 9.2 Relativistic decays; 9.3 Relativistic scattering; 9.4 Introduction to the Feynman rules; 9.5 Calculation of the cross section; 9.6 Effective nonrelativistic potential; 9.7 Identical particles  
 9.8 Pion-nucleon interactions and isospin 9.9 One-pion exchange; 9.10 Electroweak decays; Problems; 10. Quantum Electrodynamics; 10.1 The Hamiltonian; 10.2 Photon propagator:  $e\bar{p}$  scattering; 10.3 Antiparticles:  $e^+e^- \rightarrow \mu^+\mu^-$ ; 10.4  $e^+e^-$  annihilation; 10.5 Fermion propagator: Compton scattering; Problems; 11. Loops and Introduction to Renormalization; 11.1 Wick's theorem; 11.2 QED to second order; 11.3 Electron self-energy; 11.4 Vacuum bubbles; 11.5 Vacuum polarization; 11.6 Loop integrals and dimensional regularization; 11.7 Dispersion relations; 11.8 Vertex corrections  
 11.9 Charge renormalization

## Sommario/riassunto

An accessible, comprehensive reference to modern quantum mechanics and field theory. In surveying available books on advanced quantum mechanics and field theory, Franz Gross determined that while established books were outdated, newer titles tended to focus on recent developments and disregard the basics. Relativistic Quantum Mechanics and Field Theory fills this striking gap in the field. With a strong emphasis on applications to practical problems as well as calculations, Dr. Gross provides complete, up-to-date coverage of both elementary and advanced topics essential for a well-round