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	Nota di contenuto	Contents; Preface; 1 Relativistic equations; 1.1 Introduction; 1.2 Notations.; 1.3 Klein-Gordon equation; 1.3.1 Klein paradox; 1.4 Dirac equation.; 1.5 References; 2 Solutions of the Dirac equation; 2.1 Plane wave solutions; 2.2 Normalization of the wave function; 2.3 Spin of the Dirac particle.; 2.4 Continuity equation.; 2.5 Dirac's hole theory; 2.6 Properties of the Dirac matrices; 2.6.1 Fierz rearrangement; 2.7 References; 3 Properties of the Dirac equation; 3.1 Lorentz transformations; 3.2 Covariance of the Dirac equation; 3.3 Transformation of bilinears.
		3.4 Projection operators, completeness relation3.5 Helicity; 3.6 Massless Dirac particle; 3.7 Chirality; 3.8 Non-relativistic limit of the Dirac equation.; 3.9 Electron in an external magnetic field; 3.10 Foldy-Wouthuysen transformation.; 3.11 Zitterbewegung; 3.12 References; 4 Representations of Lorentz and Poincar e groups; 4.1 Symmetry algebras; 4.1.1 Rotation; 4.1.2 Translation; 4.1.3 Lorentz transformation; 4.1.4 Poincar e transformation; 4.2 Representations of the Lorentz group; 4.2.1 Similarity transformations and representations; 4.3 Unitary representations of the Poincar e group
		4.3.1 Massive representation4.3.2 Massless representation; 4.4 References; 5 Free Klein-Gordon field theory; 5.1 Introduction; 5.2 Lagrangian density; 5.3 Quantization.; 5.4 Field decomposition.; 5.5 Creation and annihilation operators.; 5.6 Energy eigenstates; 5.7 Physical meaning of energy eigenstates; 5.8 Green's functions; 5.9 Covariant commutation relations; 5.10 References; 6 Self-interacting

scalar field theory; 6.1 N other's theorem; 6.1.1 Space-time translation; 6.2 Self-interacting 4 theory.; 6.3 Interaction picture and time evolution operator; 6.4 S-matrix

6.5 Normal ordered product and Wick's theorem6.6 Time ordered products and Wick's theorem; 6.7 Spectral representation and dispersion relation; 6.8 References; 7 Complex scalar field theory; 7.1 Quantization.; 7.2 Field decomposition.; 7.3 Charge operator; 7.4 Green's functions; 7.5 Spontaneous symmetry breaking and the Goldstone theorem; 7.6 Electromagnetic coupling.; 7.7 References; 8 Dirac field theory.; 8.1 Pauli exclusion principle; 8.2 Quantization of the Dirac field.; 8.3 Field decomposition.; 8.4 Charge operator; 8.5 Green's functions; 8.6 Covariant anti-commutation relations

8.7 Normal ordered and time ordered products8.8 Massless Dirac fields; 8.9 Yukawa interaction; 8.10 Feynman diagrams; 8.11 References; 9 Maxwell field theory; 9.1 Maxwell's equations.; 9.2 Canonical quantization; 9.3 Field decomposition.; 9.4 Photon propagator; 9.5 Quantum electrodynamics; 9.6 Physical processes; 9.7 Ward-Takahashi identity in QED; 9.8 Covariant quantization of the Maxwell theory; 9.9 References; 10 Dirac method for constrained systems; 10.1 Constrained systems; 10.2 Dirac method and Dirac bracket.; 10.3 Particle moving on a sphere; 10.4 Relativistic particle 10.5 Dirac field theory

Sommario/riassunto	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 Poincare 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 interactio