1. Record Nr. UNINA9910380736203321

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Titolo	Classical and Quantum Dynamics : From Classical Paths to Path Integrals / / by Walter Dittrich, Martin Reuter
Pubbl/distr/stampa	Cham : , : Springer International Publishing : , : Imprint : Springer, , 2020
ISBN	3-030-36786-X
Edizione	[6th ed. 2020.]
Descrizione fisica	1 online resource (X, 563 p. 307 illus.)
Disciplina	530.12
Soggetti	Quantum physics Continuum physics Mathematical physics Nuclear physics Statistical physics Quantum Physics Classical and Continuum Physics Mathematical Applications in the Physical Sciences Particle and Nuclear Physics Statistical Physics and Dynamical Systems
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Introduction -- The Action Principles in Mechanics -- The Action Principle in Classical Electrodynamics -- Application of the Action Principles -- Jacobi Fields, Conjugate Points.-Canonical Transformations -- The Hamilton–Jacobi Equation -- Action-Angle Variables -- The Adiabatic Invariance of the Action Variables -- Time-Independent Canonical Perturbation Theory -- Canonical Perturbation Theory with Several Degrees of Freedom -- Canonical Adiabatic Theory -- Removal of Resonances -- Superconvergent Perturbation Theory, KAM Theorem -- Poincaré Surface of Sections, Mappings -- The KAM Theorem -- Fundamental Principles of Quantum Mechanics -- Functional Derivative Approach -- Examples for Calculating Path Integrals -- Direct Evaluation of Path Integrals -- Linear Oscillator with Time-Dependent Frequency -- Propagators for Particles in an External

Magnetic Field -- Simple Applications of Propagator Functions -- The WKB Approximation -- Computing the trace -- Partition Function for the Harmonic Oscillator -- Introduction to Homotopy Theory -- Classical Chern–Simons Mechanics -- Semiclassical Quantization -- The “Maslov Anomaly” for the Harmonic Oscillator.-Maslov Anomaly and the Morse Index Theorem -- Berry’s Phase -- Classical Geometric Phases: Foucault and Euler -- Berry Phase and Parametric Harmonic Oscillator -- Topological Phases in Planar Electrodynamics -- Path Integral Formulation of Quantum Electrodynamics -- Particle in Harmonic E-Field E(t) = Esinw0t; Schwinger-Fock Proper-Time Method -- The Usefulness of Lie Brackets: From Classical and Quantum Mechanics to Quantum Electrodynamics -- Green’s Function of a Spin-1/2 Particle in a Constant External Magnetic Field -- One-Loop Effective Lagrangian in QED -- On Riemann’s Ideas on Space and Schwinger’s Treatment of Low-Energy Pion-Nucleon Physics -- The Non-Abelian Vector Gauge Particle p -- Riemann’s Result and Consequences for Physics and Philosophy.

Sommario/riassunto

Graduate students seeking to become familiar with advanced computational strategies in classical and quantum dynamics will find in this book both the fundamentals of a standard course and a detailed treatment of the time-dependent oscillator, Chern-Simons mechanics, the Maslov anomaly and the Berry phase, to name just a few topics. Well-chosen and detailed examples illustrate perturbation theory, canonical transformations and the action principle, and demonstrate the usage of path integrals. The sixth edition has been enlarged to include the Heisenberg-Euler Lagrangian, Schwinger’s source theory treatment of the low-energy --N physics and general relativity, where Riemann’s (Einstein’s) ideas on space and time and their philosophical implications are discussed. .