Classical and quantum dynamics: from classical paths to path integrals

Dittrich, Walter, author

Abstrak

Since the previous fourth edition has received quite a positive response from students as well as teachers, we have decided to extend the contents and improve some chapters for pedagogical reasons. In particular, we have rewritten Chap. 33, which is now entitled, “Classical Geometric Phases: Foucault and Euler.” However, most importantly, we have added a new chapter, Chap. 38: “The Usefulness of Lie Brackets: From Classical and Quantum Mechanics to Quantum Electrodynamics.” We emphasize the usefulness of the Lie brackets in classical and quantum mechanics up to quantum electrodynamics. Especially many dynamical systems with (gauge) constraints can equally be treated in the time development with noncanonical variables and Hamiltonians. This is convincingly demonstrated for the electron propagation function in a constant magnetic field in three and four dimensions. We also have attempted to remove the inevitable typos from the text and formulas.