Book Review: *Introduction to Path-Integral Methods in Physics and Polymer Science*

Introduction to Path-Integral Methods in Physics and Polymer Science.
F. W. Wiegel. World Scientific, Singapore.

This recent addition to the textbooks on path integration is written in an informal way, from a physicist's point of view, without dealing with cumbersome formalism. The first three chapters, dealing with general aspects of path integrals and the Wiener integral, Brownian motion, and macromolecules, together with Chapters V and VI on path integrals in quantum physics and classical statistical physics, form the core of the book. This serves as a general introduction to path integrals in physics. The material is presented in a very clear and pedagogical manner. The beginner is often cautioned against common pitfalls in the theory of path integration and shown the bad consequences of following some intuitively appealing, but mistaken, ideas. The rest of the book presents the reader with specialized applications of path integrals in various physical contexts, including the vortex-ring model for the lambda transition, and approximate theories and the renormalization group theory of the interacting Bose fluid. Of particular interest is Chapter IV, which elaborately reviews path integrals and polymer entanglements, knots, and links. Starting from the simplest entanglement problems, the author proceeds to derive the Green's function for Brownian motion with a half-plane barrier, and then to discuss the statistical physics of knots and links. Essential theoretical tools, such as the Alexander polynomials for the characterization of knots and links, are very clearly explained. A detailed account on numerical hammagraphy and the required computer work is also given.

In the preface, Wiegel declares his intention to have written a monograph that would bridge the gap between the fundamental level of the book by Feynman and Hibbs and the more advanced level demanded from the reader in the book by Schulman. In spite of its modest goal, the book stands on its own as a rather full-bodied textbook. Though one might

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criticize, for example, the lack of suggested exercises to help master the material, my general impression is that Wiegel's book will be of great help for any student or scientist seeking to enter the field of path integrals in physics. The book includes many valuable references and their importance and relevance to the subject is usually pointed out. The book could be used as a guide for any graduate course on the subject of path integrals in physics, especially if applications to polymer science are to be included.

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