

Functional Integrals and Collective Excitations

This book describes the theory and selected applications of one of the most important mathematical tools used in the theoretical investigation of collective excitations in statistical physics, such as occur in superfluidity, superconductivity, plasma dynamics, superradiation, and in phase transitions. The author, who is a distinguished physicist and leading researcher in this area, begins with an introduction to functional integral techniques in equilibrium statistical thermodynamics, and discusses the expression of partition functions and Green functions in terms of functional integrals. Subsequent sections deal with the application of functional integrals in superfluid Bose systems, systems with Coulomb interaction, and superfluid Fermi systems. The final section considers the application of the concept of Bose-condensation of auxiliary fields to the theory of crystals, heavy atoms and also to the theory of model Hamiltonians (BCS and Dicke models).

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