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Sinopsis

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Quantum statistical mechanics plays a major role in many fields such as thermodynamics, plasma physics, solid-state physics, and the study of stellar structure. While the theory of quantum harmonic oscillators is relatively simple, the case of anharmonic oscillators, a mathematical model of a localized quantum particle, is more complex and challenging. Moreover, infinite systems of interacting quantum anharmonic oscillators possess interesting ordering properties with respect to quantum stabilization.

This book presents a rigorous approach to the statistical mechanics of such systems, in particular with respect to their actions on a crystal lattice.

The text is addressed to both mathematicians and physicists, especially those who are concerned with the rigorous mathematical background of their results and the kind of problems that arise in quantum statistical mechanics. The reader will find here a concise collection of facts, concepts, and tools relevant for the application of path integrals and other methods based on measure and integration theory to problems of quantum physics, in particular the latest results in the mathematical theory of quantum anharmonic crystals. The methods developed in the book are also applicable to other problems involving infinitely many variables, for example, in biology and economics.

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Mathematical background

Quantum mechanics and stochastic analysis

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