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Nota di contenuto	Contents ; Preface ; Chapter 1 Introduction ; 1.1 Laplace integrals ; 1.2 The problems in statistical mechanics ; 1.3 Semi-classical analysis and transfer operators ; 1.4 About the contents ; Chapter 2 Witten Laplacians approach ; 2.1 De Rham Complex ; 2.2 Witten Complex 2.3 Witten Laplacians 2.4 Semi-classical considerations ; 2.5 An alternative point of view : Dirichlet forms ; 2.6 A nice formula for the covariance ; 2.7 Notes ; Chapter 3 Problems in statistical mechanics with discrete spins ; 3.1 The Curie-Weiss model ; 3.2 The 1-d Ising model 3.3 The 2-d Ising model 3.4 Notes ; Chapter 4 Laplace integrals and transfer operators ; 4.1 Introduction ; 4.2 Classical Laplace method ; 4.2.1 Standard results ; 4.2.2 Transition between the convex case and the double well case ; 4.3 The method of transfer operators 4.4 Elementary properties of operators with integral kernels 4.5 Elementary properties of the transfer operator ; 4.6 Operators with strictly positive kernel and application ; 4.7 Thermodynamic limit ; 4.8 Mean value ; 4.9 Pair correlation ; 4.10 2-dimensional lattices

; 4.11 Notes

Chapter 5 Semi-classical analysis for the transfer operators

5.1 Introduction ; 5.2 Explicit computations for the harmonic Kac operator ; 5.3

Harmonic approximation for the transfer operator

; 5.4 WKB constructions for the transfer operator

5.5 The case of the Schrodinger operator in dimension 1

Sommario/riassunto

This important book explains how the technique of Witten Laplacians may be useful in statistical mechanics. It considers the problem of analyzing the decay of correlations, after presenting its origin in statistical mechanics. In addition, it compares the Witten Laplacian approach with other techniques, such as the transfer matrix approach and its semiclassical analysis. The author concludes by providing a complete proof of the uniform Log-Sobolev inequality.

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