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Nota di contenuto	Preface; Contents; 1. Group representation of the Cayley tree; 1.1 Cayley tree; 1.2 A group representation of the Cayley tree; 1.3 Normal subgroups of finite index for the group representation of the Cayley tree; 1.3.1 Subgroups of infinite index; 1.4 Partition structures of the Cayley tree; 1.5 Density of edges in a ball; 2. Ising model on the Cayley tree; 2.1 Gibbs measure; 2.1.1 Configuration space; 2.1.2 Hamiltonian; 2.1.3 The ground state; 2.1.4 Gibbs measure; 2.2 A functional equation for the Ising model; 2.2.1 Hamiltonian of the Ising model; 2.2.2 Finite dimensional distributions 2.3 Periodic Gibbs measures of the Ising model2.3.1 Translation-invariant measures of the Ising model; 2.3.1.1 Ferromagnetic case; 2.3.1.2 Anti-ferromagnetic case; 2.3.2 Periodic (non-translation-invariant) measures; 2.4 Weakly periodic Gibbs measures; 2.4.1 The case of index two; 2.4.2 The case of index four; 2.5 Extremality of the disordered Gibbs measure; 2.6 Uncountable sets of non-periodic Gibbs measures; 2.6.1 Bleher-Ganikhodjaev construction; 2.6.2 Zachary construction; 2.7 New Gibbs measures; 2.8 Free energies; 2.9 Ising model with an external field 3. Ising type models with competing interactions3.1 Vannimenus model; 3.1.1 Definitions and equations; 3.1.2 Dynamics of F; 3.1.2.1 Fixed points; 3.1.3 Periodic points; 3.1.4 Exact values; 3.1.5 Remarks;

3.2 A model with four competing interactions; 3.2.1 The model; 3.2.2 The functional equation; 3.2.3 Translation-invariant Gibbs measures: phase transition; 3.2.4 Periodic Gibbs measures; 3.2.5 Non-periodic Gibbs measures; 4. Information flow on trees; 4.1 Definitions and their equivalency; 4.1.1 Equivalent definitions; 4.2 Symmetric binary channels: the Ising model
 4.2.1 Reconstruction algorithms; 4.2.2 Census solvability; 4.3 q-ary symmetric channels: the Potts model; 5. The Potts model; 5.1 The Hamiltonian and vector-valued functional equation; 5.2 Translation-invariant Gibbs measures; 5.2.1 Anti-ferromagnetic case; 5.2.2 Ferromagnetic case; 5.2.2.1 Case: $k = 2, q = 3$; 5.2.2.2 The general case: $k \geq 2, q \geq 2$; 5.3 Extremality of the disordered Gibbs measure: The reconstruction solvability; 5.4 A construction of an uncountable set of Gibbs measures; 6. The Solid-on-Solid model; 6.1 The model and a system of vector-valued functional equations
 6.2 Three-state SOS model; 6.2.1 The critical value $1/\ln 2$; 6.2.2 Periodic SGMs; 6.2.3 Non-periodic SGMs; 6.3 Four-state SOS model; 6.3.1 Translation-invariant measures; 6.3.2 Construction of periodic SGMs; 6.3.3 Uncountable set non-periodic SGMs; 7. Models with hard constraints; 7.1 Definitions; 7.1.1 Gibbs measures; 7.2 Two-state hard core model; 7.2.1 Construction of splitting (simple) Gibbs measures; 7.2.2 Uniqueness of a translation-invariant splitting Gibbs measure; 7.2.3 Periodic hard core splitting Gibbs measures; 7.2.4 Extremality of the translation-invariant splitting Gibbs measure
 7.2.5 Weakly periodic Gibbs measures

Sommario/riassunto

The Gibbs measure is a probability measure, which has been an important object in many problems of probability theory and statistical mechanics. It is the measure associated with the Hamiltonian of a physical system (a model) and generalizes the notion of a canonical ensemble. More importantly, when the Hamiltonian can be written as a sum of parts, the Gibbs measure has the Markov property (a certain kind of statistical independence), thus leading to its widespread appearance in many problems outside of physics such as biology, Hopfield networks, Markov networks, and Markov logic networks. Mor
