Gibbs states in statistical mechanics and dynamical systems

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Stellingen

behorende bij het proefschrift

Gibbs States in Statistical Mechanics and Dynamical Systems

1. The description of Gibbs cocycles is substantially simpler on the one-sided shift space $X_+ = E^{\mathbb{Z}_+}$ than on the two-sided shift space $X = E^{\mathbb{Z}}$.

   [Chapter 2]

2. Great ideas often emerge independently in different fields; for example, the DLR formalism in statistical mechanics and the $G-$formalism in ergodic theory—originating from Riesz products in analysis—are effectively the same.

   [Chapter 2]

3. For Dyson models, a non-zero external magnetic field worsens the regularity of the principal eigenfunction.

   [Chapter 5]

4. The method of intermediate interactions is a powerful tool for analysing principal eigenfunctions of transfer operators associated with long-range potentials.

   [Chapter 4, Appendix to Chapter 4 and Chapter 5]

5. Despite their similar formulations and proof structures, Multifractal Formalism and Large Deviation Principles are often developed independently for various classes of dynamical systems. It would therefore be useful to develop a framework that unifies them across a broad range of systems and observables.

   [Chapter 6]

6. Studying the relationship between the phase diagrams of a spin interaction on $\mathbb{Z}$ and $\mathbb{Z}_+$ turns out to be an unexpectedly difficult problem.

   [A. Johansson, A. Öberg, M. Pollicott, Ergod. Th. & Dynam. Sys. (2019), 39, 1317–1330]
   and
   [Appendix to Chapter 4]

7. Although log-Sobolev inequalities and Gaussian concentration bounds have quite different forms, in lattice systems, the former often implies the latter.

8. Correlation inequalities are essential tools for analysing ferromagnetic spin systems, as they provide key structural insights into the behaviour of such models.

9. If Dutch people started building skyscrapers, the housing shortage in the Netherlands would disappear.

10. If PhD defences at Leiden University were allowed to take place in regular classrooms, the total time required for the PhD graduation process would be significantly reduced.

11. If people replied to emails as quickly as they checked them, then the average response time would be under five minutes.

12. If procrastination burned calories, then every PhD student would qualify as a fitness influencer.

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