Lectures on Advanced Statistical Mechanics.

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1. Quantum probability. Gleason's theorem.
2. Homogeneous ensembles. Pure-state ensembles.
3. Inhomogeneous ensembles. Prescribed ensemble fallacy.
4. Joint probability and joint quasi-probability.
5. Hidden variables in two-dimensional Hilbert space.
6. Tensor products. Schmidt decomposition.
7. Entanglement. Common Cause principle.
8. Uncertainty relations and sufficient conditions for entanglement.
9. POVM measurements. Naimark's theorem.
10. Maximum entropy method I.
11. Maximum entropy method II.
12. Quantum open systems. Gibbs distribution.
13. Foundations of quantum measurements. The measurement problem.
14. Reduction process in various interpretations of quantum mechanics.
15. Joint measurements of non-commuting observables.
16. Quantum tomography.
17. Quantum tomography via commutative measurements.
18. Quantum maximum likelihood method.
19. Adaptive measurements.
20. Adiabatic quantum computation.
21. Grover's search.
22. Classical analogues of Grover's search.
23. (Im)possibilities of hyper-Turing computation I.
24. (Im)possibilities of hyper-Turing computation II.
25. Adibatic quantum systems with and without feedback.
26. Introduction to theory of signals I.
27. Introduction to theory of signals II. Shannon-Nyiquist limit.
28. Joint probabilities of intensity and frequency.