# **Lectures on Advanced Statistical Mechanics I** (14 Lectures, 28 hours)

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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.