

Efficient Sampling from the Quantum State Space

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A random sample of quantum states with specific properties is useful for various applications. Since the quantum state space has highly complicated boundaries in high dimension due to the positivity constraint, it is challenging to incorporate the specific properties into the sampling algorithm. The Sequentially Constraint Monte Carlo (SCMC) algorithm is a powerful method for sampling quantum states in accordance with any desired properties that can be described by inequalities. For illustration, we apply this method to the sampling of quantum states with bound entanglement, high-dimensional quantum states with a desired target distribution, and uniformly distributed quantum states in regions bounded by values of the problem-specific target distribution. These examples demonstrate that the SCMC sampler is efficient and reliable; perhaps, it also overcomes the curse of dimensionality. (Based on [1])

References

- [1] W Li, R Han, J Shang, H K Ng and B-G Englert, arXiv:2109.14215 (2021)