Quantum Monte Carlo simulation with Tensor Network States

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We demonstrate that by applying Quantum Monte Carlo sampling over physical indices of a tensor network state, one could effectively reduce the computational cost of contracting a lattice. A tensor network with much larger bond dimension can be handled via importance sampling. Combining the Quantum Monte Carlo sampling with a computational fast contraction method, namely Tensor Entanglement Renormalization method to approximately contract the tensor network state, we present a bench-mark study of dimerized Heisenberg model on square lattice with bond dimension upto 8.

References

L. Wang, F. Verstraete, to be published.