

Quantum Computing and Simulation in the NISQ era

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Abstract

Advancements in quantum computing have enabled the development of small-scale quantum computers and simulators that adhere to the principles of quantum physics. Despite its rapid progress, those devices are not yet flawless and errors accumulate, posing serious challenges to their application to interesting problems. In this talk I will first address how those errors affect the results of both quantum computations and the simulation of quantum many-body systems. In particular, I will present several quantum simulation algorithms, and discuss the potentiality of displaying quantum advantage in the presence of imperfections. Finally, I will describe some new ingredients of such algorithms, like the preparation of highly entangled states, and discuss how they can be sped up with the help of measurements.