

Speaker: Ryo Suzuki

Title: Conserved charges in the quantum simulation of integrable spin chains

Abstract: This talk is about the applications of integrable systems to digital quantum computers.

We simulate the time evolution of Heisenberg spin chain from some initial state using digital quantum computers. It is known that the method of integrable Trotterization provides a simple quantum circuit while maintaining integrability.

We performed simulation on a classical and a quantum computer, by implementing an integrable quantum circuit as well as an efficient measurement protocol for the higher conserved charges along the time evolution. Then we investigate quantum noise and its effect on the charges at the early and late stages of time evolution. We expect that the higher-charge measurement can be used for benchmarking quantum computers in future.