

Quantum simulations with superconducting qubits

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In 2019, it was experimentally demonstrated that a quantum processor could perform certain computational tasks exponentially faster than a classical computer [1]. Going beyond this milestone, we seek to utilize these Noisy Intermediate Scale Quantum (NISQ) processors to study computationally intractable physics problems. The class of problems that seems within reach are quench dynamics in interacting spin systems far away from equilibrium. I will provide an overview of our progress by describing some of our recent works [2,3]. The aim of the talk is to provide a sense of what NISQ discoveries to anticipate and a time scale for them.

References

- [1] Nature 574, 505–510 (2019)
- [2] Nature 601, 531–536 (2022)
- [3] Nature 612, 240–245 (2022)

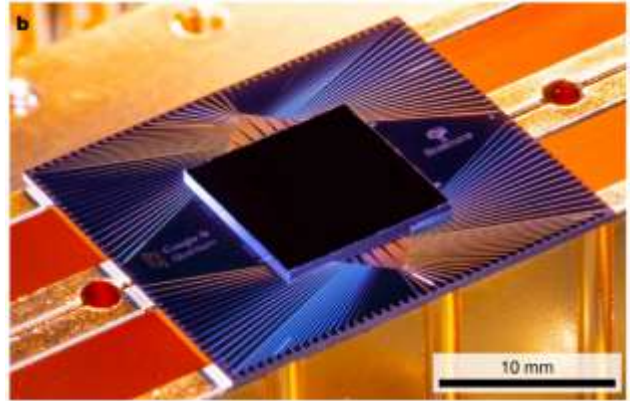


Figure 1: The Sycamore processor can be used to study problems in non-equilibrium spin dynamics.

Figures
