

Challenges and directions of quantum computing with superconducting qubits

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Abstract

The field of quantum computing has evolved into a large interdisciplinary community that includes experts from all domains including industry, government, and academia. As a result, we have seen accelerated progress towards understanding the scope of quantum computing, pushing its hardware and software technology, developing applications, and advancing error mitigation/correction protocols. In this talk, I would like to present a view on how to progress technologies for quantum computing systems using key metrics - scale, quality, speed that indicate the level of performance of a quantum computer. I will overview the recent development of superconducting quantum computing systems and the scientific advances by IBM that enabled to scale superconducting qubits to 27-qubit and 65-qubit processors. As quantum computing is becoming a research tool, I will discuss how we harness the computational power of a quantum computer in machine learning and chemistry by integrating with classical computing resources and using error mitigation. Exploiting classical resources will allow us to extend the computational capacity that the current limits of the quantum hardware can offer.
