

Quantum computing: An IBM perspective

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Abstract - Quantum physics provides an intriguing basis for achieving M. B. Ketchen computational power to address certain categories of mathematical problems that are completely intractable with machine computation as we know it today. We present a brief overview of the current theoretical and experimental works in the emerging field of quantum computing. The implementation of a functioning quantum computer poses tremendous scientific and technological challenges, but current rates of progress suggest that these challenges will be substantively addressed over the next ten years. We provide a sketch of a quantum computing system based on superconducting circuits, which are the current focus of our research. A realistic vision emerges concerning the form of a future scalable fault-tolerant quantum computer.

Keywords - quantum computing, qubit, superconducting qubit, flux qubit, phase qubit, transmon, quantum logic gate, entangled state, coherence time, quantum computer architecture

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