QUANTUM COMPUTING TECHNOLOGY: CHALLENGES AND FUTURE DIRECTIONS

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Abstract: In the past decade, the quantum computing community has expanded from a small, research-focused group of physicists, engineers and mathematicians to a large interdisciplinary field that includes experts from all domains including industry, government, and academia. As a result, we have seen accelerated progress toward understanding the scope of quantum computing, advancing its hardware technology, and developing applications and error correction protocols. In this talk, I would like to present IBM's five-year vision for developing quantum computing technology, including how we will push the limits of hardware and how we make a quantum computer more practical by integrating with classical computing resources to increase execution capacity. At the end of the talk, I will briefly cover the directions and roles of materials science for quantum hardware development - what's the current limitation and what should be the future.

Biography: Dr. Hanhee Paik is a Research Staff Member at IBM Quantum, IBM T J Watson Research Center. Through her research career, she has been focusing on understanding the coherence mechanisms of superconducting qubits and developing superconducting multi-qubit architectures. Dr. Paik pioneered the novel design of a superconducting qubit that helped the industry to push the boundary of superconducting qubit performance and her research on the quantum processor design has greatly impacted the quantum computing community. Today's IBM Quantum systems coherence times benefit from Dr. Paik's work, and average an industry-best 100 microseconds. She played a pivotal role developing the 16-qubit IBM Q Experience device (Rueschlikon and Melbourne), and she is currently working on developing the next generation of quantum computing processors.