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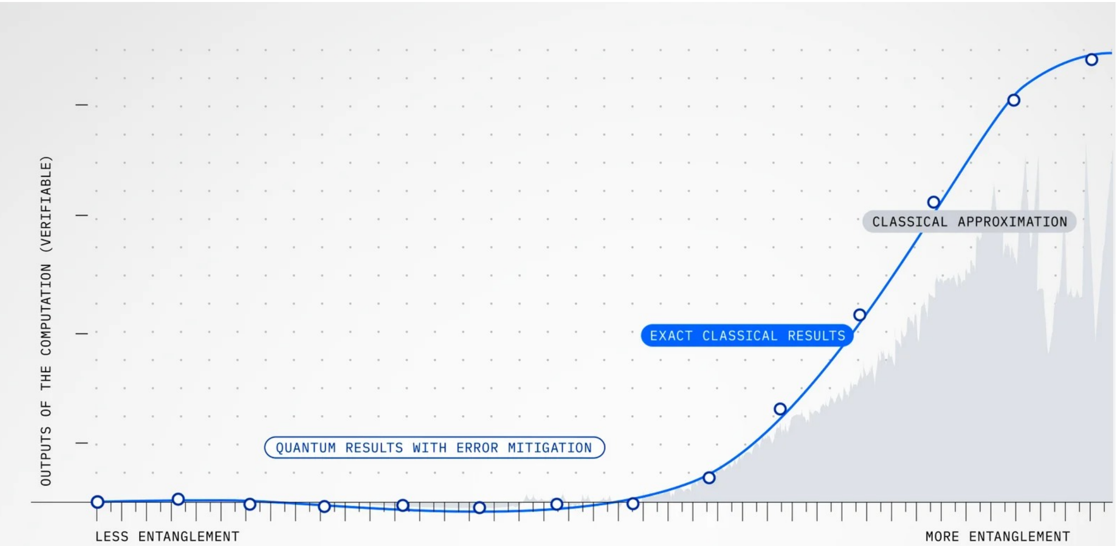
NTU Q

PRACTICAL APPLICATIONS FOR 127-QUBIT QUANTUM PROCESSORS WITH ERROR MITIGATION



Source: IBM

IBM Quantum and UC Berkeley researchers have collaborated to explore the usefulness of today's 127-qubit quantum processors with error mitigation. They conducted physical simulations, comparing results obtained from the IBM Quantum Eagle processor with those from state-of-the-art classical approximation methods on supercomputers. The goal was to determine if noisy quantum computers could deliver accurate results for specific problems. Surprisingly, the quantum computer consistently outperformed classical methods, even for complex simulations beyond the capabilities of brute force calculations. The results, published in Nature, demonstrate the potential value of noisy quantum computers, thanks to advances in IBM Quantum hardware and error mitigation techniques.

While it's not claimed that current quantum computers surpass classical computers, the iterative process of running complex circuits on quantum computers and verifying results with classical computers enhances both domains and instills confidence in near-term quantum computing capabilities. Quantum computers can now be seen as tools for studying challenging problems that were previously difficult to explore.

In summary, this collaborative research demonstrates the potential of noisy quantum computers and highlights their utility in solving complex problems. The results provide a foundation for further advancements in quantum computing and inspire confidence in near-term quantum systems.

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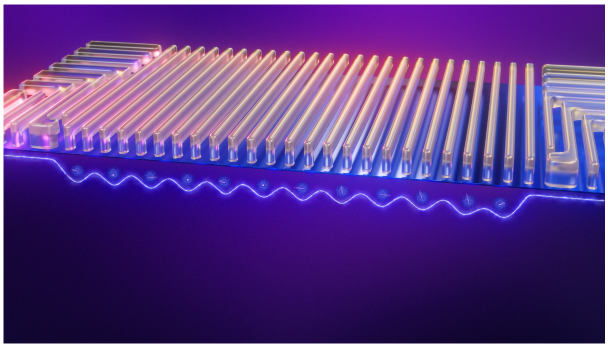
INTEL'S NEW CHIP TO ADVANCE SILICON SPIN QUBIT RESEARCH FOR QUANTUM COMPUTING

Intel announced the release of its newest quantum research chip, Tunnel Falls. Tunnel Falls is Intel's first silicon spin qubit device released to the research community. Fabricated on 300-millimeter wafers in the D1 fabrication facility, the 12-qubit device leverages Intel's most advanced transistor industrial fabrication capabilities, such as extreme ultraviolet lithography (EUV) and gate and contact processing techniques. In silicon spin qubits, information (the 0/1) is encoded in the spin (up/down) of a single electron. Each qubit device is essentially a single electron transistor, which allows Intel to fabricate it using a similar flow to that used in a standard complementary metal oxide semiconductor (CMOS) logic processing line. At the same time, utilizing advanced CMOS fabrication lines allows Intel to use innovative process control techniques to enable yield and performance. For example, the Tunnel Falls 12 qubit device has a 95% yield rate across the wafer and voltage uniformity similar to a CMOS logic process, and each wafer provides over 24,000 quantum dot devices. These 12-dot chips can form between four to 12 qubits that can be isolated and used in operations simultaneously depending on how the university or lab operates its systems.



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SELECTED EVENTS

Qiskit User's Forum Taiwan 2023 is coming

NTU Hub has held annual users' meetings to foster and cultivate the users in Taiwan to get familiar with and the to master quantum computing skills. At the Event, the invited Experts will share their experience and tips on Qiskit applications. This activity is open to all who interest in quantum computing!

計畫補助單位：MOST 科技部 Ministry of Science and Technology

IBM Quantum Computer Hub at National Taiwan University

Rm.711, Dept. of Physics /Center for Condensed Building

No. 1, Sec.4 Roosevelt Rd., Da'an Dist. Taipei City 106319, Taiwan

ntuq2018@gmail.com :+886 2-33669928 http://quantum.ntu.edu.tw/