

| RELEVANT RESEARCH TO IBM Q @NTU

## Hybrid classical-quantum linear solver using Noisy Intermediate-Scale Quantum machines

Chih-Chieh Chen, Shiue-Yuan Shiau, Ming-Feng Wu and Yuh-Renn Wu

We propose a realistic hybrid classical-quantum linear solver to solve systems of linear equations of a specific type, and demonstrate its feasibility with Qiskit on IBM Q systems. This algorithm makes use of quantum random walk that runs in  $O(N \log(N))$  time on a quantum circuit made of  $O(\log(N))$  qubits. The input and output are classical data, and so can be easily accessed. It is robust against noise, and ready for implementation in applications such as machine learning. Scientific Reports 9, 16251 (2019)

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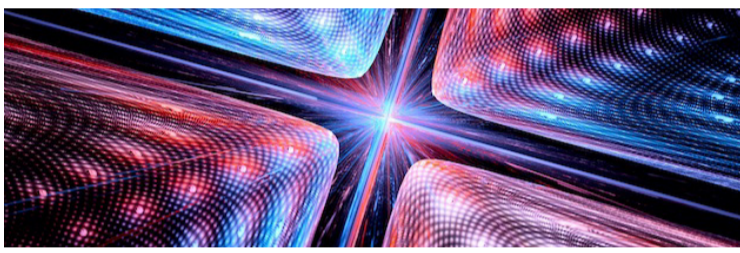


| SELECTED NEWS

## NTHU develops quantum encryption against quantum hacker

The research team leading by Prof. Chih-Sung Chuu in National Tsing Hua University completes the first quantum encrypted communication in Taiwan. They use optical fiber link between National Tsing Hua University and National Chiao Tung University (about 4 km) to demonstrate the first Taiwan's outdoor quantum key distribution. Since the system tolerates an error rate up to 2.5% when there is no eavesdropper, it can detect any theft attempt as the error would exceed the threshold.

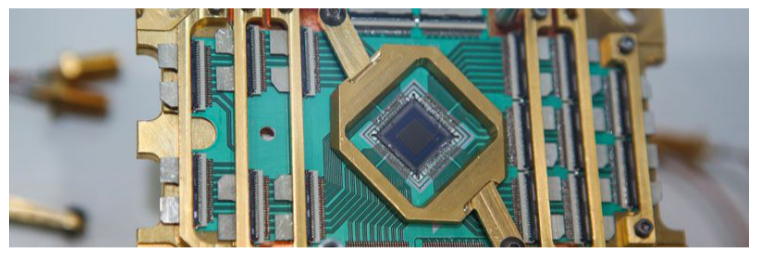
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## The U.S. launches The Quantum Information Edge strategic alliance

A nationwide alliance launched in America on December 20, 2019 to accelerate quantum computing research and development.

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## Russia and Israel funding quantum programs

The Russian and Israeli governments will inject US\$ 790 million and US\$ 350 million into quantum research over the next few years, respectively.

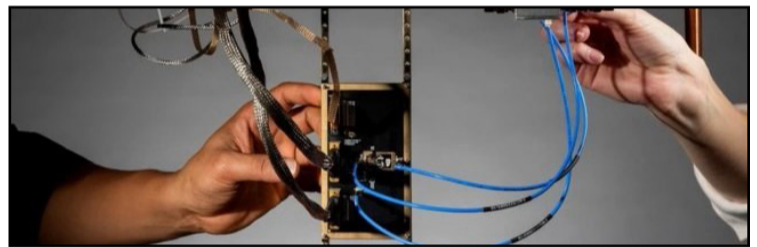
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## China's quantum satellite links with world's first mobile ground station

China's quantum satellite, Micius, has successfully linked up with a mobile ground station when it was ~500 km above the ground.

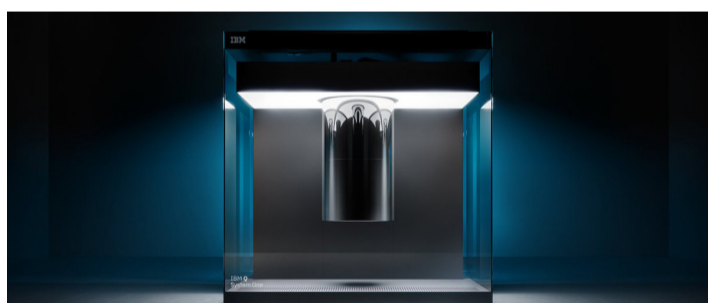
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## Microsoft released an open cloud quantum computing service "Azure Quantum"

Microsoft released a quantum service, providing customers access to quantum offerings that connects classical computers and quantum devices.

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## IBM and the University of Tokyo launch quantum computing initiative for Japan

IBM and University of Tokyo announced an agreement to form a Japan-IBM quantum partnership on Dec. 19, 2019. IBM will ship an IBM Q System One to University of Tokyo, which will be the third installation of this kind.

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## Intel introduces "Horse Ridge" to enable commercially viable quantum computers

Intel unveiled a cryogenic control chip, code-named "Horse Ridge", for which is fabricated by Intel 22nm FinFET low Power and is designed to operate at 4 Kelvin approximately.

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| RELEVANT INTERESTING RESEARCH

- [Quantum supremacy using a programmable superconducting processor](#)
- [Phonon heat transfer across a vacuum through quantum fluctuations](#)
- [Determining eigenstates and thermal states on a quantum computer using quantum imaginary time evolution](#)
- [Non-Hermitian Hamiltonians and no-go theorems in quantum information](#)
- [High-rate, high-fidelity entanglement of qubits across an elementary quantum network](#)

| COMING EVENTS

### NTU-IBM Q Hub x CMU Forum | Taipei, Taiwan

The Forum is organized by NTU-IBM Quantum Computer Hub at National Taiwan University at March 12-13, 2020. It aims to bring together experts to exchange knowledge in the fields of quantum computing, artificial intelligence, economics, and econometrics. It also provides an opportunity for the attendees to share their experience of using IBM Q system. We are confident that this forum will be a confident step to broaden the community of both quantum computing and economics. The registration system will be open after the Chinese New Year.

### Quantum Computing Summer School Fellowship

LANL will hold a 10-week summer school in New Mexico. The successful recipients will be awarded fellowship that covers travel, living expenses and a salary based on academic rank.

[APPLICATION](#)

### 22nd Annual SQuLnT Workshop | Eugene, U.S.A.

SQuLnT brings together the broad community of researchers in quantum information science, including experimental physicists, theorists, and computer scientists.

[REGISTRATION](#)



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