Quantum Computing for the Near Future

By
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Host: Asst Prof Mile Gu

Abstract
In the near future, it is possible that quantum devices with 50 or more high quality qubits can be engineered. On one hand, these quantum devices could potentially perform specific computational tasks that cannot be simulated efficiently by classical computers. On the other hand, the number of qubits would not be enough for implementing textbook quantum algorithms. An immediate question is how one might exploit these near term quantum devices for really useful tasks? In addition, one may also expect that these powerful quantum devices are accessible only through cloud services over the internet, which imposes the question of how might one verify the server, behind the internet, does own a quantum computer instead of a classical simulator? In this talk, I will share my thoughts over these questions based on my recent works.

Short Biography
Dr. Man-Hong Yung is the vice dean of the Shenzhen Institute for Quantum Science and Engineering (SIQSE) in Shenzhen and Chief Scientist for quantum algorithms and software at Huawei Technologies. He is also faculty at the Southern University of Science and Technology (SUSTech).

Dr. Yung obtained a bachelor and a master degree in physics at the Chinese University of Hong Kong. Then, he moved to the University of Illinois Urbana-Champaign where he obtained a PhD degree under the supervision of Prof. Anthony Leggett. Next, he joined Harvard University as a postdoctoral researcher in the research group of Prof. Alan Aspuru-Guzik. Before present appointments, he returned to China and worked as an assistant professor at the Institute for Interdisciplinary Information Sciences directed by Prof. Andrew Yao at Tsinghua University. His recent research interests include quantum simulation, quantum control, quantum machine learning, and applications for near-term quantum devices. He is one of the inventors of the method of variational quantum eigensolver (VQE) for simulating quantum chemistry. He is also involved in the first experimental demonstration of applying the unitary coupled-cluster ansatz on VQE.