Research Seminar

Higher-order quantum computation

Speaker: Prof. Mio Murao, University of Tokyo
Date: 25 Jul, 2024 (Thu)
Time: 14:30, HKT
Venue: RM308, Chow Yei Ching Building, HKU

Abstract:
Supermaps are higher-order transformations that take maps as input. We explore quantum algorithms that implement supermaps of unitary operations using either multiple or divisible calls to a black-box unitary operation. Specifically, we present algorithms for qubit-unitary inversion in the former scenario and for transforming Hamiltonian dynamics in the latter. These algorithms for transforming Hamiltonian dynamics exemplify quantum functional programming, where the desired function is defined as higher-order quantum computation, involving a concatenation of higher-order quantum transformations.

References:
S. Yoshida, A. Soeda and M. Murao, Phys. Rev. Lett. 131, 120602 (2023)
T. Odake, S. Yoshida and M. Murao, arXiv:2405.07625
T. Odake, H. Kristjánsson A. Soeda M. Murao, Phys. Rev. Res. 6, L012063 (2024)
T. Odake, H. Kristjánnson, P. Taranto, M. Murao, arXiv2312.08848 (2024

Bio:
Prof. Mio Murao received her B.S., M.S., and Ph.D. degrees from Ochanomizu University in Tokyo, Japan, in 1991, 1993, and 1996, respectively. She pursued postdoctoral research at Harvard University (US), Imperial College London (UK), and RIKEN (Japan). In 2001, she joined the Department of Physics at the School of Science, University of Tokyo, as an associate professor, and in 2015, she was promoted to professor. Since 1997, she has been dedicated to the field of theoretical quantum information science, with current research interests in quantum programming, quantum algorithms, quantum learning, and distributed quantum computation.

All are welcome!
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