

Joint CQSE & NCTS Special Seminar

2023
Aug. 11, Friday

TIME Aug. 11, 2023, 2:30~3:30pm
TITLE Robust quantum search algorithm via non-unitary Zeno-like dynamics
SPEAKER Prof. Aurel Gabris (Czech Technical University in Prague)
PLACE NCTS Physics Lecture Hall, 4F, Chee-Chun Leung
Cosmology Hall, NTU
ONLINE <https://nationaltaiwanuniversity-zbn.my.webex.com/>



Abstract:

Measurement has proven to be a powerful tool that not only allows us to learn about a quantum system but also to control its state. The quantum Zeno-effect (QZE) is a widely-employed technique for quantum control, which is based on repeated frequent measurements of the entire system or part of it. In our work we consider an algorithm that is a variant of the continuous search algorithm introduced by Farhi and Gutmann. We show that the algorithm scales similarly to the pure quantum version by establishing tighter bounds on its efficiency for arbitrary database sizes and measurement parameters. We study the behavior of the algorithm subject to noise, and find that under certain oracle and operational errors our measurement-based algorithm outperforms the standard algorithm, showing robustness against these noises. Our algorithm follows a scheme based on the combination of time-dependent measurement and Hamiltonian evolution of the system, admitting a non-unitary description and exhibiting a non-periodic time dependence of the target fidelity. Since it is based on repeated measurements and post selection, the survival probability associated with successfully completing the desired number of steps may be less than one, in addition to the usual probability related to the target fidelity.

Biography Brief:

Aurél Gábris is presently a faculty member at the Czech Technical University in Prague and holds a part-time position at the Wigner Research Institute for Physics in Budapest, Hungary. His present research interests focus on quantum walks, their optical implementations, as well as the role and applications of measurement for quantum information.

on protocols. In his academic career he is also dedicated to education and promotion of quantum technologies, being involved in the EU Quantum Flagship's project on master s-level education, DigiQ, as a member of the executive committee.

