COLLOQUIUM

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State transfer in complex quantum walks

Mathematics and Statistics

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https://uregina-ca.zoom.us/j/92508741353?pwd=UzFOMjVMelVkRWhqR215cjd6dTlCQT09

Abstract: The continuous-time quantum walk on a finite graph X is defined by the time-dependent unitary matrix

$$U(t) = e^{itH},$$

where the Hamiltonian H is some Hermitian matrix associated with X. Perfect state transfer from vertex a to vertex b occurs if $U(t)_{b,a}$ has unit magnitude at some time t. This phenomenon is relevant for information transmission in quantum spin networks. Most previous studies on perfect state transfer used the adjacency matrix or the Laplacian matrix of X as the Hamiltonian.

In this talk, we focus on continuous-time quantum walks with complex Hamiltonian. We examine how state transfer with complex Hamiltonian behaves differently from the quantum walks whose Hamiltonian is the adjacency matrix or the Laplacian matrix of a graph.

This is joint work with Chris Godsil, Christino Tamon, Xiaohong Zhang, and Fields undergraduate summer research students Antonio Acuaviva, Summer Elridge, Matthew How and Emily Wright.

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