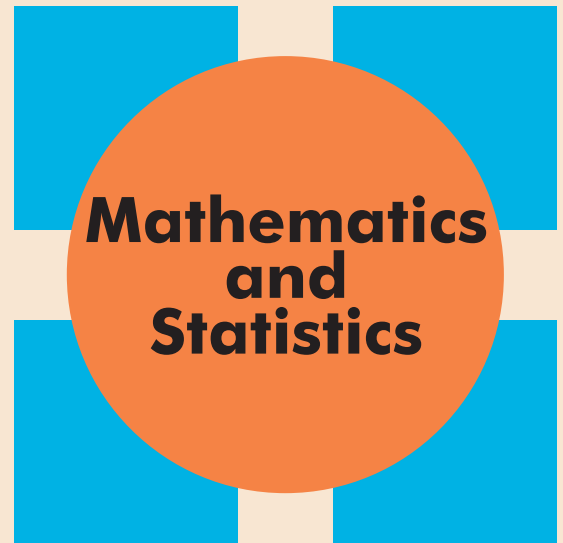


PRAIRIE MATHEMATICS COLLOQUIUM

Steve Kirkland
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State transfer for paths with weighted loops



Date: Thursday January 27, 2022

Time: Tea social at 2:00 PM, talk at 2:30 PM

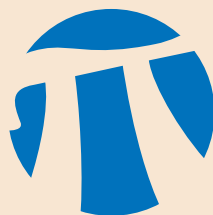
Zoom link: <https://uregina-ca.zoom.us/j/96148969936?pwd=MmVZZ3RyUkQ3M3U1ZVI1Q09zUmNDUT09>

Abstract: Faithful transmission of information is an important task in the area of quantum information processing. One approach to that task is to use a network of coupled spins (which can be modelled as an undirected graph) and to transfer a quantum state from one vertex to another. We can then consider the fidelity of transmission from a source vertex to a target vertex to measure the accuracy of the transmission. The last two decades have seen substantial growth in research on the topic of state transfer in spin networks.

In this talk, we consider a spin network consisting of an unweighted path on n vertices, to which a loop of weight w has been added at each end vertex. Let $f(t)$ denote the fidelity of state transfer from one end vertex to the other at time t ; it turns out that for any t , $0 \leq f(t) \leq 1$, and that $f(t)$ close to 1 corresponds to high accuracy of transmission, while $f(t)$ close to 0 corresponds to poor accuracy. We give upper and lower bounds on $f(t)$ in terms of w , n and t ; further, given $a > 0$ we discuss the values of t for which $f(t) > 1 - a$. In particular, the results show that the fidelity can be made close to 1 via suitable choices of w , n and t . Throughout, the results rely on a detailed analysis of the eigenvalues and eigenvectors of the associated adjacency matrix. This talk is based on joint work with Christopher van Bommel.

This event is supported by PIMS.

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