XIAOHONG ZHANG, Université de Montréal
Laplacian state transfer

Let X be a graph, and let H be a Hermitian matrix associated to X, which is usually taken to be the adjacency or Laplacian matrix. At time t, the transition matrix of the continuous quantum walk on X relative to H is $U(t) = exp(itH)$. If the initial state of the walk is given by a density matrix D (positive semidefinite matrix of trace 1), then the state $D(t)$ of the walk at time t is $D(t) = U(t)DU(-t)$.

For $a \in V(X)$, we use e_a to denote the vector in $C^{V(X)}$ taking value 1 on the a-th coordinate and 0 elsewhere. Vertex states transfer has been studied extensively. Chen and Godsil introduced and studied pair state transfer, where the density matrix is $D = 1/2(e_a - e_b)(e_a - e_b)^T$, a scaled Laplacian matrix of the graph on $V(X)$ with exactly one edge ab. Both types of states are pure (D is of rank 1). In this talk, we consider perfect state transfer between more general states, and give characterizations of when perfect state transfer occurs. Transfer between rational states (all entries of D are rational), in particular Laplacian states (D is a scaled Laplacian matrix) will be discussed.