Quantum Graphs

Gabriel Agnew

Mathematical Sciences, New Mexico State University

A graph is a pair (G, R) where G is a set of nodes and R is a set of undirected edges between the nodes of G. In this talk, we will compare classical graphs with their non-commutative analogs: quantum graphs. Quantum graphs have applications to quantum error correction in the field of quantum information theory, as well as connections to physics and logic.

We consider a particular class of quantum graphs as represented by subspaces of $M_n(\mathbb{C})$, the space of all $n \times n$ matrices with complex-valued entries. We say a subspace $R \subseteq M_n(\mathbb{C})$ is a quantum graph if it is closed under taking the conjugate transpose operation, $\dagger$. We will present various definitions and properties of quantum graphs, comparing them with their classical analogs.