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Seth S Cottrell* (cottrell@cims.nyu.edu). *Finding Substructures in Highly Symmetric Graphs Using Quantum Walks and an Efficient Technique for Creating Grover-Type Algorithms.*

In this talk the Grover algorithm will be recast as a discrete time quantum walk on a highly symmetric star graph. I will describe the necessary and sufficient conditions for quadratic-speed searches for any connected subgraph. The quantum walk framework allows for a great deal of generalization. This talk will apply a scattering theory approach to find efficient methods for rapidly calculating all of the necessary quantities for arbitrary graphs; simple enough to be done with pen and paper for smaller graphs. These methods can be used to understand the signal response for any graph, or any combination of connected graphs, and to calculate “how different” a subgraph needs to be to ensure it is detectable using the Grover algorithm. (Received September 15, 2015)