

Spatial Search using Lackadaisical Quantum Walks

The coined quantum walk is a discretization of the Dirac equation of relativistic quantum mechanics, and it is a useful model for developing quantum algorithms. For example, many quantum spatial search algorithms are based on coined quantum walks. In this talk, we explore a lazy version of the coined quantum walk, called a lackadaisical quantum walk, which uses a weighted self-loop at each vertex so that the walker has some amplitude of staying put. We show that lackadaisical quantum walks can solve the spatial search problem more quickly than a regular, coined quantum walk for a variety of graphs, suggesting that it is a useful tool for improving quantum algorithms.