

Abstract

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“Quantum search on simplicial complexes”

The quantum walk (QW) is a quantum analogue of classical random walk (RW) and is deeply investigated by many researchers in various area. QW has a lot of kinds of definitions; Grover walk, Szegedy walk, bipartite walk, and so on. All of these definitions constructs QW on discrete graphs $G = (V, E)$, which is a pair of the sets of vertices and edges.

In this talk, we would like to propose a definition of QW on simplicial complexes; We call it simplicial quantum walk (SQW). It is well-known that QW has impressive features, which are different from RW; namely, linear spreading, localization, (and quantum tunneling). These features seems to strongly depend on the geometrical structure of G . Using our proposal, we expect to be able to study it. I would like to talk about (0) definition of SQW, (1) the relation between SQW and bipartite walk, and (2) quantum search problem on our SQW. In particular, I would like to show some numerical simulations of quantum search problem on SQW. This is a joint work with Kaname Matsue (Kyusyu Univ.) and Etsuo Segawa (Yokohama National Univ.).