Spectral analysis of quantum walks with an anisotropic coin

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Abstract

We perform the spectral analysis of the evolution operator U of quantum walks with an anisotropic coin, which include one-defect models, two-phase quantum walks, and topological phase quantum walks as special cases. In particular, we determine the essential spectrum of U, we prove the discreteness of the eigenvalues of U outside the thresholds, and we prove the absence of singular continuous spectrum for U. Our analysis is based on new commutator methods for unitary operators in a two-Hilbert spaces setting, which are of independent interest.

This is a joint work with Serge Richard (Nagoya University) and Akito Suzuki (Shinshu University).

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