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Spectral Graph Theory for Quantum Codes and Quantum Algorithms project

Title: « Quantum Expansion Testing using QFF and Seed Sets »

Abstract:

Expansion testing asks to decide whether an n-node graph has expansion at least \Phi, or is far from any such graph. We propose a quantum expansion tester with complexity \tilde{O}(n^{1/3}\Phi^{-1}). This accelerates the \tilde{O}(n^{1/2}\Phi^{-2}) classical tester by Goldreich and Ron [Algorithmica '02], and combines the quantum speedups by Ambainis, Childs and Liu [RANDOM '11] and Apers and Sarlette [QIC '19]. The latter approach builds on a quantum fast-forwarding scheme, which we improve upon by initially growing a seed set in the graph. For growing this seed set we borrow a so-called evolving set process from the graph clustering literature, which allows to grow an appropriately local seed set.