

Estimation and control of open quantum systems 220517

Optical quantum computers with quantum teleportation

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Abstract

We are now pursuing the realization of large-scale fault-tolerant universal optical quantum computers with our original continuous-variable quantum teleportation methodology. There are several points. One is that we can build a logical qubit for quantum error correction with a single pulse of light. It is totally different situation from other systems like super-conducting qubits, spins, and ions, which are two-level systems and thus they need many physical qubits and entanglement among them for building a logical qubit. We can replace the fragile multipartite entanglement with quantum correlation of photons in a single pulse of light. Another point of our methodology is that we do not have to be worried about decoherence of the system. We are using our original time-domain multiplexing methodology and make a measurement before the decoherence. We can continue quantum computing forever in principle.