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Experimental quantum fingerprinting with weak coherent pulses

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Abstract

Quantum communication holds the promise of creating disruptive technologies that will play an essential role in future communication networks. For example, the study of quantum communication complexity has shown that quantum communication allows exponential reductions in the information that must be transmitted to solve distributed computational tasks. Recently, protocols that realize this advantage using optical implementations have been proposed. Here we report a proof-of-concept experimental demonstration of a quantum fingerprinting system that is capable of transmitting less information than the best-known classical protocol. Our implementation is based on a modified version of a commercial quantum key distribution system using off-the-shelf optical components over telecom wavelengths, and is practical for messages as large as 100 Mbits, even in the presence of experimental imperfections. Our results provide a first step in the development of experimental quantum communication complexity.
