Article

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Experimental long-distance quantum secure direct communication

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Abstract

Quantum secure direct communication (QSDC) is an important quantum communication branch, which realizes the secure information transmission directly without encryption and decryption processes. Recently, two table-top experiments have demonstrated the principle of QSDC. Here, we report the first long-distance QSDC experiment, including the security test, information encoding, fiber transmission and decoding. After the fiber transmission of 0.5 km, quantum state fidelities of the two polarization entangled Bell states are 91% and 88%, respectively, which are used for information coding. We theoretically analyze the performance of the QSDC system based on current optical communication technologies, showing that QSDC over fiber links of several tens kilometers could be expected. It demonstrates the potential of long-distance QSDC and supports its future applications on quantum communication networks.

Keywords

Quantum secure direct communication, polarization entangled Bell state, optical fibers, Bell's inequality test, Bell state measurement

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