

A Quantum Secure Direct Communication Protocol Based on Six-qubit Cluster State

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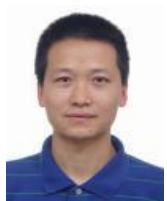
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Abstract—To enhance the efficiency of eavesdropping detection in quantum secure direct communication, a quantum secure direct communication protocol based on six-qubit cluster state is proposed. In the security analysis, the method of the entropy theory is introduced, and three detection strategies are compared quantitatively by using the constraint between the information eavesdroppers can obtain and the interference introduced. If the eavesdropper obtains the same amount of information, she must face a larger detection probability in the presented scheme than the other two, and if obtains the whole information, the detection rate of the PingPong protocol is 50%; the second protocol which used two particles of EPR pair as detection particles is also 50%; while the presented protocol is 94%. At last, the security of the proposed protocol is discussed. The analysis results indicate that the protocol in this paper is more secure than the other two.

Keyword—quantum secure direct communication, six-qubit cluster state, eavesdropping detection



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