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Approximate and Conditional Teleportation of an Unknown Atomic-Entangled State Without Bell-State Measurement

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Abstract: A scheme for approximately and conditionally teleporting an unknown atomic-entangled state in cavity QED is proposed. It is the novel extension of the scheme of [Phys. Rev. A 69 (2004) 064302], where the state to be teleported is an unknown atomic state and where only a time point of system evolution and the corresponding fidelity implementing the teleportation are given. In fact, there exists multi-time points and the corresponding fidelities, which are shown in this paper and then are used to realize the approximate and conditional teleportation of the unknown atomic-entangled state. Naturally, our scheme does not involve the Bell-state measurement or an additional atom, which is required in the Bell-state measurement, only requiring one single-mode cavity. The scheme may be generalized to not only the teleportation of the cavity-mode-entangled-state by means of a single atom but also the teleportation of the unknown trapped-ion-entangled-state in a linear ion trap and the teleportation of the multi-atomic entangled states included in generalized GHZ states.

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