The effect of noisy environments on Sequre Quantum Teleportation of unimodal Gaussian states

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Quantum communication networks can be built on quantum teleportation, which is the transmission of an unknowable quantum state from a sending station to a remote receiving station supported by entangled states and classical communication. A continuous-variable two-mode squeezed vacuum is used as a resource state in this survey. The state is shared by Alice and Bob, and the system comes into contact with three Bosonic environment types (squeezed thermal, thermal and squeezed vacuum states). We investigate the evolution of the fidelity and steering of the teleportation in order to determine the parameters required for a successful quantum teleportation of an arbitrary one-mode Gaussian state. The conditions for secure quantum teleportation are teleportation fidelity larger than the threshold value of classical teleportation fidelity and two-way steering in the output state. It is revealed that under similar physical conditions, the allowed time for teleportation while the environment is in a squeezed thermal state is better than the allowed time for two other types.

In this work with the use of the following measure, we investigate the evolution of the Secure Quantum Teleportation for our system [**?**]:

$$\mathcal{L} = \min\{S^{A\to B}, S^{B\to A}, F - \frac{2}{3}\}.$$

by solving Master equation in markovian approximation.

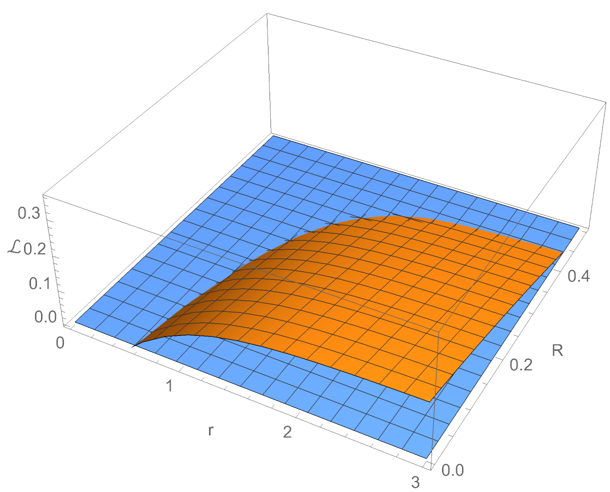

Fig. 1. The regions where $\mathcal{L} > 0$ versus squeezing r of the initial state and squeezing R of the squeezed thermal environment at the moment of time $t = 1$ for $T = 1, \gamma = 0.1$.

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[1] D. Afshar, F. Abbasnezhad, S. Mehrabankar and A. Isar (2020), "Two-mode Gaussian states as resource of secure quantum teleportation in open systems", Ch. J. Phys, 1261, PP. 1-15.**E99**, 99998 (1999).