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Mesoscopic twin-beam states propagating through noisy and lossy channels for novel Quantum Communication protocols

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Quantum states of light represent a useful tool for encoding and transmitting information. The main obstacle to the successful implementation of communication protocols, especially over long distances, is given by the losses and noise sources affecting the transmission channels, which can irreversibly change the statistical properties of the employed nonclassical states of light. At variance with the usual schemes, based on single-photon quantum states, in our work we show that mesoscopic twin-beam states exhibit very good robustness to both losses and noise sources. This result suggests the implementation of novel communication protocols based on twin-beam states in which information is encoded in noise superimposed on the quantum states and losses simulate an eavesdropper's interference.

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