XIth International Symposium: Quantum Theory and Symmetries(QTS)
July 1-5, 2019
Invited lecture - Session on Quantum Computing & Quantum Information Theory

New lower bounds to the output entropy of multi-mode quantum Gaussian channels

Giacomo De Palma *

giacomo.depalma@math.ku.dk

We prove that quantum thermal Gaussian input states minimize the output entropy of the multi-mode quantum Gaussian attenuators and amplifiers that are entanglement breaking and of the multi-mode quantum Gaussian phase contravariant channels among all the input states with a given entropy. This is the first time that this property is proven for a multi-mode channel without restrictions on the input states. A striking consequence of this result is a new lower bound on the output entropy of all the multi-mode quantum Gaussian attenuators and amplifiers in terms of the input entropy. We apply this bound to determine new upper bounds to the communication rates in two different scenarios. The first is classical communication to two receivers with the quantum degraded Gaussian broadcast channel. The second is the simultaneous classical communication, quantum communication and entanglement generation or the simultaneous public classical communication, private classical communication and quantum key distribution with the Gaussian quantum-limited attenuator.

*Department of Mathematical Sciences, University of Copenhagen, Universitetsparken 5, Copenhagen, Kobenhavn 2100, DENMARK