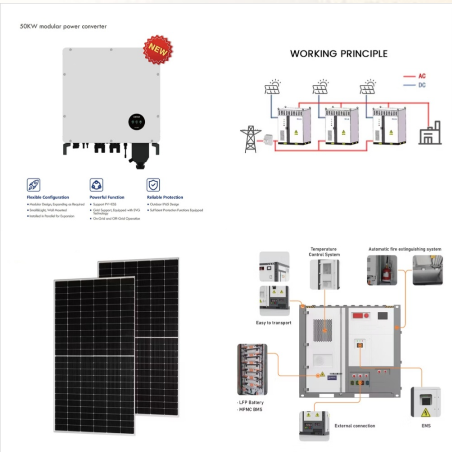
We prove the conditional Entropy Power Inequality for Gaussian quantum systems. This fundamental inequality determines the minimum quantum conditional von Neumann entropy of the output of the beam-splitter or of the squeezing among all the input states where the two inputs are conditionally independent given the memory and have given quantum conditional a?|



The conditional entropy power inequality is proved in the scenario where the conditioning system is quantum, based on the heat semigroup and on a generalization of the Stam inequality in the presence of quantum conditioning.

It is proved that the quantum conditional Entropy Power Inequality is optimal in the sense that it can achieve equality asymptotically by choosing a suitable sequence of Gaussian input states. We prove the quantum conditional Entropy Power Inequality for quantum additive noise channels. This inequality lower bounds the quantum conditional entropy of the output of a?|

ENTROPY POWER INEQUALITY FOR QUANTUM SYSTEMS

Shannon's entropy power inequality (EPI) can be viewed as a statement of concavity of an entropic function of a continuous random variable under a scaled addition rule: f (a X + 1 a?? a Y) a?JPY a f (X) + (1 a?? a) f (Y) a?? a a?? [0, 1]. Here, X and Y are continuous random variables and the function f is either the differential entropy or the entropy power.Konig and Smith [IEEE a?|

1 Classical and quantum entropy-power inequalities The entropy power inequality, proposed by Shannon [27] and later established with increasing rigor by Stam [29] and Blachman [5], has become a fundamental tool in classical informa-tion theory. Shannon's original application of the entropy power inequality is a lower bound

Gaussian states also minimize the output entropy or maximize the achievable rate of communication by Gaussian channels. One sees this using quantum entropya??power inequalities on the convolution of CV states (7a??17). This statement is a quantum analogue of Shannon's entropy power inequality (18a??20).

ENTROPY POWER INEQUALITY FOR QUANTUM SYSTEMS

We propose a generalization of the quantum entropy power inequality involving conditional entropies. For the special case of Gaussian states, we give a proof based on perturbation theory for symplectic spectra.

In this study, the quantum Renyi entropy power inequality of order p > 1 and power Io is introduced as a quantum analog of the classical Renyi-p entropy power inequality. To derive this inequality, we first exploit the Wehrl-p entropy power inequality on bosonic Gaussian systems via the mixing operation of quantum convolution, which is a generalized beam-splitter operation.

Specifically, inequality (63) in the mentioned paper, intended to give an upper bound on the entropy of certain Gaussian states, is incorrect. In that paper, we used inequality (63) to derive the asymptotic (large-time) scaling of the entropy under the quantum version of a?|

ENTROPY POWER INEQUALITY FOR QUANTUM SYSTEMS

In the conditional Entropy Power Inequality for bosonic quantum systems [11,17], the random variables Xand Yare replaced by quantum Gaussian systems modeling the electromagnetic radiation and Entropy Power Inequalities for quantum Gaussian systems of Refs. [11,17,18]. If the quantum system M is not present, quantum Gaussian states do not

Here we prove one possible generalization of the Entropy Power Inequality to quantum bosonic systems. The impact of this inequality in quantum information theory is potentially large and some

640 G. De Palma, D. Trevisan of two independent random variables A and B with values in Rk.The classical Entropy Power Inequality [13,21,22] states that, if A and B have Shannon differential entropy i!?xed to the values S(A) and S(B), respectively, the Shannon differential entropy of C is minimized when A and B have a Gaussian probability distribution with proportional

ENTROPY POWER INEQUALITY FOR QUANTUM SYSTEMS

The conjectured entropy-power inequality, which determines the lower bound of channel capacity, is mathematically proved even in the quantum regime. In most communication schemes, information is transmitted via travelling modes of electromagnetic radiation. These modes are unavoidably subject to environmental noise along any physical transmission a?|

The Entropy Power Inequality for Quantum Systems Nevertheless, the entropy power inequality (EPI), which states that e 2H(Z) a?JPY e 2H(X) +e 2H(Y), gives a very tight restriction on the entropy of Z. This inequality has found many applications in information theory and statistics. The quantum analogue of adding two random variables is the

discussion of the entropy power inequality. 1.1 Our contribution Similarly to the work carried out in [11] for the beam splitter, we prove the conditional version of the entropy power inequality for the convolution given by (5). Let us consider an n-mode Gaussian quantum system a?|

ENTROPY POWER INEQUALITY FOR QUANTUM SYSTEMS

This inequality has found many applications in information theory and statistics. The quantum analogue of adding two random variables is the combination of two independent bosonic modes at a beam splitter. The purpose of this work is to give a detailed outline of the proof of two separate generalizations of the entropy power inequality to the

We have proved the multimode conditional quantum Entropy Power Inequality for bosonic quantum systems (Theorem LABEL:theo:MCQEPI), which determines the minimum von Neumann conditional entropy of the output of any linear mixing of bosonic modes among all the input states with given conditional entropies.Moreover, we have determined new lower bounds a?|

Recently, a quantum (Gaussian) version of the entropy power inequality, namely the quantum entropy power inequality (QEPI), has been proved [20,21] and applied to several information-processing

ENTROPY POWER INEQUALITY FOR QUANTUM SYSTEMS

In the conditional Entropy Power Inequality for bosonic quantum systems [9,15], the random variables Xand Y are replaced by quantum Gaussian systems modeling the electromagnetic radiation and Entropy Power Inequalities for quantum Gaussian systems of Refs. [9,15,16]. If the quantum system M is not present, quantum Gaussian states do not

We propose an extension of the quantum entropy power inequality for finite dimensional quantum systems, and prove a conditional quantum entropy power inequality by using the majorization relation as well as the concavity of entropic functions also given by Audenaert et al (2016 J. Math. Phys.57 052202). Here, we make particular use of the fact that a?|

The conditional Entropy Power Inequality for bosonic quantum systems 5 inequality is optimal. In section 8 we apply the quantum conditional Entropy Power Inequality to prove an upper bound to the entanglement-assisted clas-sical capacity of a non-Gaussian quantum channel. We conclude in a?|

ENTROPY POWER INEQUALITY FOR QUANTUM SYSTEMS

A generalization of the quantum entropy power inequality involving conditionalEntanglement-assisted classical communication over additive bosonic noise channels and a proof based on perturbation theory for symplectic spectra are given. We propose a generalization of the quantum entropy power inequality involving conditional entropies. For the a?|

The conditional Entropy Power Inequality for Gaussian quantum systems is proved, based on a new Stam inequality for the quantum conditional Fisher information and on the determination of the universal asymptotic behaviour of the Quantum conditional entropy under the heat semigroup evolution. We prove the conditional Entropy Power Inequality for Gaussian a?|

sible generalization of the Entropy Power Inequality to quantum bosonic systems. The impact of this inequality in quantum information theory is potentially large and some relevant implications are considered in this work. 1 arXiv:1402.0404v2 [quant-ph] 7 May 2015

ENTROPY POWER INEQUALITY FOR QUANTUM SYSTEMS

The study of quantum correlations in high-dimensional bipartite systems is crucial for the development of quantum computing. We propose relative entropy as a distance measure of correlations may be measured by means of the distance from the quantum

The conditional entropy power inequality is proved in the scenario where the conditioning system is quantum, based on the heat semigroup and on a generalization of the Stam inequality in the presence of quantum conditioning. The conditional entropy power inequality is a fundamental inequality in information theory, stating that the conditional entropy of the sum of two a?|