

Investigations of quantum superadditivity

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Certain noisy quantum communication channels exhibit a property known as superadditivity, through which the amount of information the channel is capable of faithfully transmitting scales nonlinearly with channel use, e.g., using the channel twice can more than double the amount of information transferred, violating the usual additivity principle of classical communication. These channels rely on a special balance of noise: too much or too little and any improvement is quickly lost. However, in these regions, superadditivity can allow for improvements over classical communication when finite use is a consideration. We report on progress demonstrating superadditivity in the dephasure channel, a channel which combines probabilistic dephasing and erasure. The dephasure channel is used because of its simplicity and low-use requirements, a rarity among superadditive channels.