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Assessing the performance of quantum repeaters for all phase-insensitive Gaussian bosonic channels KENNETH GOODENOUGH, DAVID ELKOUSS, STEPHANIE WEHNER, Delft Univ of Tech, QUTECH TEAM — One of the most sought-after goals in experimental quantum communication is the implementation of a quantum repeater. Quantum repeaters can be assessed by comparing their performance with the quantum- and private capacity of a direct transmission, assisted by unlimited classical two-way communication. Calculating these quantities is hard to compute however, motivating the search for upper bounds on these capacities. Takeoka, Guha and Wilde found the squashed entanglement of a quantum channel to be an upper bound on these capacities. In general it is hard to find the exact value of the squashed entanglement of a quantum channel, but clever, sub-optimal squashing maps still allow one to upper bound this quantity, and thus also the corresponding capacities. We follow this approach to upper bound the capacity of some specific channels, where in particular we extend the analysis of Takeoka et al. on the pure-loss channel to the general case of any Gaussian bosonic channel with equal noise in each quadrature. This bound is of practical importance, since it allows one to benchmark the implementation of quantum repeaters in quantum key distribution networks for a large class of channels.

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