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Strong converse rates for classical communication over thermal bosonic channels BHASKAR ROY BARDHAN, Department of Physics and Astronomy, Louisiana State University, MARK WILDE, Department of Physics and Astronomy and Center for Computation and Technology, Louisiana State University — We prove that several known upper bounds on the classical capacity of thermal bosonic channels are actually strong converse rates. Our results strengthen the interpretation of these upper bounds, in the sense that we now know that the probability of correctly decoding a classical message rapidly converges to zero in the limit of many channel uses if the communication rate exceeds these upper bounds. In order for these theorems to hold, we need to impose a maximum photon number constraint on the states input to the channel (the strong converse property need not hold if there is only a mean photon number constraint). Our first theorem demonstrates that a capacity upper bound due to Koenig and Smith is a strong converse rate, and we prove this result by utilizing their structural decomposition of a thermal channel into a pure-loss channel followed by an amplifier channel. Our second theorem demonstrates that an upper bound due to Giovannetti *et al.* corresponds to a strong converse rate, and we prove this result by relating success probability to coding rate and bosonic entropies. Both bounds are within 1.45 bits of the known lower bound on capacity that arises from a coherent-state coding scheme.

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