

Continuity bounds on the quantum relative entropy

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The quantum relative entropy is frequently used as a distance measure between two quantum states, and inequalities relating it to other distance measures are important mathematical tools in many areas of quantum information theory. We have derived many such inequalities in our previous work (K.M.R. Audenaert and J. Eisert, J. Math. Phys. 46, 102104 (2005)). The present paper is a follow-up on this, and provides sharp upper bounds on the relative entropy in terms of the trace norm distance and of the smallest eigenvalues of both states concerned. The results obtained here are more general than the corresponding one from our previous work, and also corrects a mistake in one of its proofs. As a by-product, we obtain a sharp upper bound on the regularised relative entropy introduced by Lendi, Farhadmotamed and van Wonderen.

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