

Tight Entropic Uncertainty Relations

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Entropic uncertainty relations $H(A) + H(B) \geq \gamma$ give a nonzero lower bound γ to the sum of the Shannon entropies H of the outcome probabilities of incompatible observables A and B . They are better than the variance-based uncertainty relations because they only depend on the Born statistics of the outcomes and not on the outcomes themselves, and because bounds γ typically are state independent. Here we provide a state-independent lower bound γ_s that is better than the textbook Maassen-Uffink bound and, in the limit of the parameter $s \rightarrow 2$, becomes asymptotically tight for all A, B . The bound can be extended to Renyi entropies.