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Observational entropy of quantum correlations and entanglement

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The use of coarse graining to connect physical and information theoretic entropies has recently been given a precise formulation in terms of "observational entropy", a measure of the uncertainty about a system's state that incorporates the specific operation an observer performs to acquire information about that state. Observers with access to limited sets of measurements observe an entropy excess above the absolute minimal represented by von Neumann's entropy, an excess that we denote as "entropy gap". In this work, we first investigate entropy gaps in their full generality, then explore their emergence in multipartite systems where observers are subject to various locality restrictions. By examining different classes of measurements, we demonstrate that each class's entropy gap provides a distinct and useful perspective on quantifying quantum correlations. Furthermore, we establish connections between entropy gaps and well-known measures of quantum correlations and entanglement, while also presenting analytical calculations of the gaps for widely studied multipartite quantum states

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