Tenseurs : information quantique, complexité et combinatoires quantiques

Tensors: Quantum Information, Complexity and Combinatorics

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Tensors and entanglement I: Asymptotic entanglement transformations

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The aim of this talk is to give an introduction to a problem in quantum Shannon theory, the characterization of transformations of pure multipartite entangled states in the asymptotic limit of many independent copies. In this problem, the task is to turn copies of a given initial state to as many copies of a given target state as possible, using only local operations and classical communication. We consider three variants: 1) the target is to be reached exactly, but only with an arbitrarily small probability; 2) the transformation is exact, and in addition we impose an exponentially decreasing lower bound on the success probability; and 3) the result of the transformation is approximately equal to the target state, with high probability. The first one turns out to be the same as the asymptotic restriction preorder of the tensors that represent these states, therefore it is characterized by the asymptotic spectrum of tensors. Similar characterizations also exist in the other two cases, in terms of functionals that are monotone in a suitable sense. I will explain some results and conjectures about these monotone quantities.