

Polyhedral Approaches to Quantum Information

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Abstract

Quantum information explores a new paradigm which utilizes quantum mechanics for information processing. Quantum computation can perform integer factoring in a polynomial time, which has great impact against the security of RSA public key cryptosystem, and on the other hand quantum cryptography provides a completely secure communication guaranteed by the physical law. Such powers are derived by making use of properties special in quantum law, one of which is quantum nonlocality (entanglement).

Bell inequalities can verify the nonlocality property by a violation of Bell inequalities in quantum correlation experiments. From the viewpoint of combinatorial optimization, Bell inequalities exactly corresponds to facets of the cut polytope of a certain graph. Via this connection, polyhedral approaches can reveal essential characteristics of quantum nonlocality. In this talk we review our results in this direction.

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