CENTRE
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Tenseurs : information quantique, complexité et combinatoires quantiques

Tensors: Quantum Information, Complexity and Combinatorics

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Multiplayer parallel repetition for three player games on binary Inputs

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The parallel repetition question is a central problem in complexity theory, with applications to PCPs and hardness of approximation, quantum information and communication complexity. In this setting, we have players that play a game in which they receive questions sampled from some joint distribution and their goal is to return answers that satisfy a predicate. The parallel repetition question asks: For games that cannot be won with probability 1, if we run parallel and independent instances of the game, what is the maximum probability of winning all the instances? For games with two players, a celebrated result of Raz and Holenstein shows that the probability of winning all copies decays exponentially fast in the number of copies. However, for games with three or more players, this is a wide open conjecture. The best known provable rate of decay is extremely slow; as slow as the reciprocal of the inverse Ackermann function. In a series of works, we show that for all three-player games where the inputs to each player are either zero or one, parallel repetition decreases the probability of winning at least polynomially fast. In this talk, we will survey the landscape of multiplayer parallel repetition and present the state-of-the-art results.

This is based on joint works with Justin Holmgren, Kunal Mittal, Ran Raz and Wei Zhan.