ENTANGLED XOR GAMES AND GROTHENDIECKS INEQUALITY

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Abstract. In this talk I will present some recently discovered connections between entangled XOR games and generalizations of Grothendieck's inequality (a fundamental theorem in analysis). XOR games describe the simplest experimental setup in which Nature's non-local behavior–due to entanglement–as predicted by quantum mechanics, can be verified. In the late 80's Tsirelson showed that Grothendieck's inequality can be interpreted as saying that for two-player XOR games, there is a constant upper bound on the advantage entangled layers have over non-entangled players, whose actions can be described by classical physics. I will describe how certain generalizations of Grothendieck's inequality allow us to analyse more complex XOR-games, including those that aim to measure the added value of having more entanglement and those in which more than two players participate. Additionally, I will show how finding an upper bound on one of the associated generalizations of Grothendieck's constant gave rise to an approximation algorithm for the so-called positive semidefinite Grothendieck problem with rank constraint.