

# Grothendieck inequalities for semidefinite programs with rank constraint

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Grothendieck inequalities are fundamental inequalities which are frequently used in many areas of mathematics and computer science. They can be interpreted as upper bounds for the integrality gap between two optimization problems: A difficult semidefinite program with rank-1 constraint and its easy semidefinite relaxation where the rank constrained is dropped. For instance, the integrality gap of the Goemans-Williamson approximation algorithm for MAX CUT can be seen as a Grothendieck inequality. In this paper we consider Grothendieck inequalities for ranks greater than 1 and we give one application in statistical mechanics: Approximating ground states in the n-vector model.

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