

Physics, entanglement, and semidefinite programming

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Abstract

Entanglement is one of the most mysterious phenomena in quantum computing, and physics in general. One of the ways this mystery is manifested is that we do not have closed-form formulas, or even any computationally efficient ways, to quantify entanglement.

In this talk I will discuss a better-than-brute force (specifically exponential in the *square root* of the dimension) algorithm for the Best Separable State (BSS) problem in quantum information theory. Even if you don't care about quantum information at all, BSS is a very natural problem, and a prototypical member of a class of problems of finding structured objects in linear subspaces, that have recently been of great interest in areas such as machine learning and signal processing.

The talk will not assume any knowledge in quantum mechanics nor semidefinite programming, but hopefully by its end you will get a glimpse of the connection between the two. Based on joint work with Pravesh Kothari and David Steurer.