LEVENT TUNCEL, University of Waterloo, Waterloo, Ontario N2L 3G1
Convex Optimization meets Real Algebraic Geometry

Lift-and-project operators provide an automatic way for constructing all facets of the convex hull of $0, 1$ vectors in a polytope given by linear or polynomial inequalities. They also yield tractable approximations provided that the input polytope is tractable and that we only apply the operators $O(1)$ times. There are many generalizations of these operators which can be used to generate arbitrarily tight, convex relaxations of essentially arbitrary nonconvex sets.

I will show how to utilize some fundamental theorems in convex optimization to provide convergence theories for convex relaxation hierarchies and show how to use these techniques to prove sum-of-squares type representation theorems for polynomials that are nonnegative over some compact set.