1145-14-2280 **Cynthia Vinzant***, North Carolina State University, Department of Mathematics, Raleigh, NC 27695. *The geometry of spectrahedra.*

A spectrahedron is an affine slice of the convex cone of positive semidefinite real symmetric matrices. Spectrahedra form a rich class of convex bodies that are computationally tractable and appear in many areas of mathematics. Examples include polytopes, ellipsoids, and more exotic convex sets, like the convex hull of some curves. Techniques for maximizing a linear function over a spectrahedron are called semidefinite programs. These numerical polynomial-time algorithms generalize linear programs and form a powerful tool in optimization.

The geometry of spectrahedra is fundamental to the theory of semidefinite programming, just as the geometry of polyhedra is to that of linear programming. This lecture will introduce the theory of spectrahedra and describe how convex geometry, real algebraic geometry, and topology all contribute to our understanding of their intricate geometry. We will use this to explore examples and applications coming from distance geometry, moment problems, and combinatorial optimization. (Received September 25, 2018)