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Spectrahedral representation of polar orbitopes

Let K be a compact Lie group. An important class of linear representations V of K is given by the polar representations. Examples are the standard unitary group actions on rectangular matrices, or on hermitian or skew-hermitian matrices, over \mathbb{R} , \mathbb{C} or \mathbb{H} . The orbitope of a vector $x \in V$ is the convex hull \mathcal{O}_x of the orbit Kx in V . In this talk we'll try to illustrate some general recent results on polar orbitopes, using classical group actions as examples. Some of these results are: (1) Every polar orbitope \mathcal{O}_x is a spectrahedron, i.e. an affine-linear slice of the psd matrix cone of some size. (2) The coorbitope \mathcal{O}_x^o , defined as the convex set polar to \mathcal{O}_x , is the convex hull of finitely many K -orbits. (3) If x has "rational coefficients" then \mathcal{O}_x^o is again a spectrahedron. (Joint work with Tim Kobert)