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A McMullen formula for the number of lattice points of generalized permutohedra.

Finding the number of integer points of an integral polytope P is a classical problem in polyhedral geometry. One possible approach is through a McMullen formula, a formula of the form:

$$|P \cap \mathbb{Z}^n| = \sum_{F \subset P} \alpha(F, P) \text{nv} \text{ol}(F),$$

where the sum is over all faces, and $\alpha(F, P)$ are rational numbers depending just on the feasible cone of F in P . The function $\alpha(F, P)$ is not uniquely determined and different constructions have been discovered. We explore a particular one, given by Berline and Vergne, on generalized permutohedra, deformations of regular permutohedra. We conjecture that the resulting α are positive, this relates to the positivity of the coefficients of their Ehrhart polynomials. We established close connections between this α values, mixed Ehrhart theory for hypersimplices, and the Todd class of the permutohedral toric variety. (Received September 17, 2015)