

abstract

MEMBERS SEMINAR

Topic:

Speaker:

Affiliation:

Date:

Time/Room:

Kostka numbers and Littlewood-Richardson coefficients appear in the representation theory of complex semisimple Lie algebras of type A, respectively as the multiplicities of weights in irreducible representations, and the multiplicities of irreducible factors in tensor products of irreducibles. Despite a number of formulas for them, they are very hard to compute.

Using a variety of tools from representation theory (Gelfand-Tsetlin diagrams), convex geometry (vector partition functions), symplectic geometry (Duistermaat-Heckman measure) and combinatorics (hyperplane arrangements), we show that, for fixed rank, the weight multiplicities are given by polynomials in the cells of a complex of cones. For a fixed dominant weight, the nonzero weight multiplicities consist of the lattice points inside a permutahedron. The polynomials exhibit interesting factorization patterns in the boundary regions of the permutahedron. Some of the techniques used generalize to the case of Littlewood-Richardson coefficients.

This is joint work with Sara Billey and Victor Guillemin.