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Multidegrees, their computation, and applications

Homogeneous polynomials can be interpreted as T-equivariant cohomology classes on affine space. Having positive coefficients is a sign that they are geometric, or more precisely, “effective”, being representable as the class of a T-invariant subscheme. With such a geometric interpretation in hand, there are various ways to compute the class in automatically positive ways.

I'll explain a couple of general recipes for doing this, one being “geometric vertex decompositions”, and apply them to matrix Schubert varieties; one payoff will be a bunch of old and new formulæ for double Schubert (and Grothendieck) polynomials.

It's not too much of a surprise, though, that geometry helps one compute Schubert polynomials, as they have a geometric origin. So I'll also talk about a very surprising application of multidegrees in statistical mechanics, where the combinatorics predated the geometry, and is still very mysterious.

This work is joint with Ezra Miller, Alex Yong, and Paul Zinn-Justin.