1086-52-755 **Jesus De Loera*** (`deloera@math.ucdavis.edu`), Dept. of Mathematics, University of California, Davis, CA 95616. *Top Ehrhart coefficients of integer partition problems.* Preliminary report.

Top Ehrhart coefficients of integer partition problems

For a given sequence $\mathbf{a} = [\alpha_1, \alpha_2, \ldots, \alpha_N]$ of N positive integers, we consider the parametric integer partition problem $\alpha_1 x_1 + \alpha_2 x_2 + \cdots + \alpha_N x_N = t$, where right-hand side t is a varying non-negative integer. It is well-known that the number $E_{\mathbf{a}}(t)$ of solutions in non-negative integers x_i is given by a quasi-polynomial function of t of degree N. the so called Ehrhart quasipolynomial function, very prominent in algebraic combinatorics. Computing the entire function $E_{\mathbf{a}}(t)$ is known to be #P-hard, and even deciding when the function vanishes is NP-hard. I present a new polynomial time algorithm that for a fixed number k, we computes the highest k+1 coefficients of the quasi-polynomial $E_{\mathbf{a}}(t)$ represented as step polynomials of t. This is a nice applicatio of a natural poset on the set of possible gcd's of subsets of numbers in **a**. To conclude, I present some applications to understanding the periodicity of $E_{\mathbf{a}}(t)$ for some classical partition problems. This is joint work with **V. Baldoni, N. Berline, M. Koeppe, and M. Vergne.** (Received September 12, 2012)