

# AVERAGE EHRHART COEFFICIENTS AND SYMPLECTIC HECKE EIGENBASES

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ABSTRACT. Ehrhart showed that the function counting lattice points of dilates of lattice polytopes in Euclidean space is a polynomial. The coefficients of this polynomial, therefore, provide interesting information about the original lattice polytope. We consider the functions that map lattice polytopes to the  $\ell$ -th coefficient of their Ehrhart polynomials. These functions form a basis for the space of so-called unimodular invariant valuations. We show that, in even dimensions, these functions are in fact simultaneous symplectic Hecke eigenfunctions. We leverage this and apply the theory of spherical functions and their associated zeta functions to prove analytic, asymptotic, and combinatorial results about arithmetic functions averaging  $\ell$ -th Ehrhart coefficients.

No prior knowledge of any of topics in this abstract should be necessary to enjoy this talk. We report on joint work with Claudia Alfes and Christopher Voll.