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Rational Ehrhart Theory

Matthias Beck[1,2]***, Sophia Elia***[1] ***and Sophie Rehberg***[1] [mattbeck@sfsu.edu]

[1] Mathematisches Institut, Freie Universität Berlin, Germany
[2] Department of Mathematics, San Francisco State University, U.S.A.

The Ehrhart quasipolynomial of a rational polytope P encodes fundamental arithmetic data of P, namely, the number of integer lattice points in positive integral dilates of P. Ehrhart quasipolynomials were introduced in the 1960s, satisfy several fundamental structural results and have applications in many areas of mathematics and beyond. The enumerative theory of lattice points in rational (equivalently, real) dilates of rational polytopes is much younger, starting with work by Linke [1], Baldoni–Berline–Koeppe–Vergne [2], and Stapledon [3]. We introduce a generating-function *ansatz* for rational Ehrhart quasipolynomials, which unifies several known results with classical Ehrhart quasipolynomials, as well as generalized reflexive polytopes studied by Fiset–Kasprzyk [4] and Kasprzyk–Nill [5].

Keywords
rational polytope, lattice point enumeration, rational Ehrhart quasipolynomial

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