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*Lattice point counting and the Hodge theory of degenerating
hypersurfaces*

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Abstract: Geometric properties of generic hypersurfaces in projective toric varieties are often determined by the combinatorics of their corresponding Newton polytopes, in particular, by the lattice point enumeration of dilates of the Newton polytope. Pioneering work of Danilov-Khovanskii gave combinatorial descriptions for certain topological and Hodge theoretic invariants in terms of combinatorics. In joint work with Alan Stapledon, we outline an alternative approach. Here, we degenerate the hypersurface into a union of linear subspaces and use the limit mixed Hodge structure to understand the cohomology. In addition, we discuss a theory of the combinatorics of subdivisions of polytopes to understand invariants of degenerating families of hypersurfaces.

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