

Workshop on Combinatorial Hopf Algebras
and Macdonald Polynomials

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Combinatorial aspects of $\nabla(s_\lambda)$

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Abstract

The ∇ operator of F. Bergeron and A. Garsia is defined over the ring of symmetric functions with coefficients in the field $\mathbb{Q}(q, t)$. It has, by definition, the modified Macdonald polynomials as eigenfunctions. Most famously, $\nabla(e_n)$ is the Frobenius series for the n -th diagonal harmonics module.

We conjecture a combinatorial framework for the monomial expansion of ∇ applied to any Schur function. In particular, we describe the coefficient of any m_μ in such a $\nabla(s_\lambda)$ as the sum of suitably weighted, like-sign tuples of labeled Dyck paths. The tuples are t -weighted by an “area” statistic and q -weighted by a “diagonal inversion” statistic. We prove this conjecture when $q = 1$.

This is joint work with N. Loehr. In fact, this talk can be viewed as a continuation of his talk from Monday.