

Workshop on Combinatorial Hopf Algebras  
and Macdonald Polynomials

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## The combinatorics of Macdonald's $D_n^1$ operator

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### **Abstract**

To prove the existence of the Macdonald polynomials  $\{P_\lambda(x; q, t)\}_{\lambda \vdash n}$ , Macdonald introduced an operator  $D_n^1$  and proved that for any Schur function  $s_\lambda(x_1, \dots, x_n)$ ,  $D_n^1(s_\lambda(x_1, \dots, x_n)) = \sum_\mu d_{\lambda, \mu}(q, t) s_\mu(x_1, \dots, x_n)$  where the sum runs over all partitions  $\mu$  of  $n$  which are less than or equal to  $\lambda$  in the dominance order and the  $d_{\lambda, \mu}(q, t)$  are polynomials in  $q$  and  $t$  with integer coefficients. We give an explicit combinatorial formula for the  $d_{\lambda, \mu}(q, t)$ 's.