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Combinatorial Aspects of the Bergeron-Garsia Nabla Operator

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Abstract

The nabla operator introduced by Francois Bergeron and Adriano Garsia plays a key role in the theory of symmetric functions and Macdonald polynomials. Over the past decade, many advances have been made in our understanding of the combinatorial significance of the nabla operator. This talk will survey recent research in this area, beginning with the "q,t-Catalan Theorem" of Garsia, Haglund, and Haiman and ending with a new conjectured formula for the image of any Schur function under nabla (which is joint work with Greg Warrington). Along the way, we will encounter many fascinating combinatorial and algebraic entities, including parking functions, quantum lattice paths inside squares, LLT polynomials, diagonal harmonics modules, and (inevitably) Macdonald polynomials.