

Level zero Littelmann paths, Kirillov-Reshetikhin crystals, parabolic quantum Bruhat graph, and Macdonald polynomials.

Mark Shimozono, Virginia Polytechnic Institute and State University

In a joint project with Cristian Lenart, Satoshi Naito, Daisuke Sagaki, and Anne Schilling, we study the specialization of a Macdonald polynomial at $t=0$. In untwisted affine type we show that it is the graded character of a tensor product of one-column Kirillov-Reshetikhin (KR) modules. In simply laced affine type this was known due to the work of Ion and of Fourier and Littelmann and in type C by Lenart and Schilling.

We obtain several explicit uniform combinatorial formulas for this graded character:

- (1) Lakshmibai-Seshadri (canonical Littelmann) paths for a level-zero weight for the untwisted affine algebra, projected to the finite weight lattice;
- (2) certain walks in the parabolic quantum Bruhat graph, which come from quantum cohomology of homogeneous spaces;
- (3) alcove walks controlled by the Borel quantum Bruhat graph.