Workshop on Combinatorial Hopf Algebras
and Macdonald Polynomials
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Alcove paths, Hall-Littlewood polynomials, and a Hopf algebra

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Abstract

This talk is concerned with a combinatorial model for the irreducible representations of complex semisimple Lie algebras, that was introduced in *joint work with A. Postnikov*. I will refer to this model as the alcove path model, since it is based on combinatorics of the affine Weyl group. Based on this model, we can express the corresponding irreducible characters, and study the combinatorics of Kashiwara's crystals. Moreover, the model can be used to describe Ram's q-crystals, and to reformulate Schwer's and Ram's monomial expressions for the Hall-Littlewood polynomials of arbitrary Lie type. Thus, it offers a possible approach to generalizing the monomial formula for the type A Macdonald polynomials due to Haglund, Haiman, and Loehr. In the second part of the talk, I will discuss the way in which the alcove path model leads to a realization of the K-theory of generalized flag varieties as a subalgebra of the Nichols-Woronowicz Hopf algebra (*joint work with T. Maeno*).