

Professor Masaki Kashiwara, RIMS, Kyoto
Title: Crystal theory and LLTA theory

Abstract

I introduced the notion of crystal bases and global bases while investigating the representation theory of quantum group at $q=0$, where q is a parameter of the quantum group. It becomes a powerful tool which connects the representation theory and combinatorics.

On the other hand, Lascoux-Leclerc-Thibon and Ariki discovered and proved a new link between the representation theory of the affine Hecke algebras of type A and crystal bases of the affine quantum group of type A. Namely, the K-group of the representations of the affine Hecke algebras of type A is isomorphic to the algebra of functions on the maximal unipotent subgroup of the group associated with the affine Lie algebra of type A, and the irreducible representations correspond to the upper global basis.

Later, I. Grojnowski gave an explicit crystal structure on the isomorphism classes of irreducible representations of the affine Hecke algebras. J. Brundan and A. Kleshchev showed a similar link between Hecke-Clifford superalgebras and the affine quantum group of type $A^{(2)}_{2n}$. Recently, I proposed a conjectural link between the representation theory of the affine Hecke algebras of type B and a symmetric crystal, a new combinatorial object.

In these talks, I explain the LLTA theory starting from the theory of crystal bases.