

8th International Conference on Symmetries and Integrability of Difference  
Equations (SIDE8) **June 22–28, 2008**  
8<sup>e</sup> Conférence internationale “Symétrie et intégrabilité des équations aux  
différences” (SIDE8) **22–28 juin, 2008**

## Representation theory and $q$ -difference equations in quantum integrable lattice models

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### **Abstract**

I will give an overview of sets of  $q$ -difference equations arising in the context of quantum integrable lattice models, namely the six-vertex or XXZ model and its generalizations. These  $q$ -difference equations can be obtained via the decomposition of evaluation modules of the quantum affine algebra associated with  $\mathfrak{sl}(2)$ . The solutions to the difference equations are directly linked with solutions to the Bethe ansatz equations occurring in the quantum inverse scattering solution of these models. I will point out a number of open questions concerning the case when  $q$  is a root of unity. In the simplest case,  $q^3 = 1$ , the solution is explicitly known in terms of Schur functions. Time permitting I will also discuss the scaling limit to the XXX model.