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PERFECT CRYSTALS OF QUANTUM AFFINE LIE ALGEBRAS

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0. Introduction. In 1985, while studying the solutions of the quantum Yang-Baxter equation, Drinfeld [D1] and Jimbo [J1] independently discovered a fundamental algebraic object known as a *quantized universal enveloping algebra* or *quantum group* $U_q(\mathfrak{g})$ associated with a symmetrizable Kac-Moody Lie algebra $\mathfrak{g}$ which may be thought of as a q-analogue or q-deformation of the universal enveloping algebra of $\mathfrak{g}$. The quantized universal enveloping algebra has a Hopf algebra structure and thus allows the tensor product structure on their representations. The quantized universal enveloping algebra associated with an affine Lie algebra is also known as a *quantum affine Lie algebra.* In [L] (also see [R]), it has been shown that for generic q (i.e., q is not a root of unity) the integrable representations of a Kac-Moody Lie algebra can be deformed consistently to those of the corresponding quantized universal enveloping algebra. In particular, the internal structure of the integrable highest-weight representations of an affine Lie algebra is essentially the same as that of the corresponding quantum affine Lie algebra. However, working in the larger context of a quantum affine Lie algebra, it often becomes easier to extract more informations about the representations of the corresponding affine Lie algebra by using the power of abstraction in representation theory.

The eminent role of the quantized universal enveloping algebras in two-dimensional solvable lattice models is widely known. The R-matrices, which are the intertwiners of tensor product representations, give the Boltzmann weights of the lattice models with commuting transfer matrices ([J2]). The quantum parameter q

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