

Fusion products and constant term identities: Difference equations

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There is a remarkably simple way to write generating functions for fermionic formulas for graded tensor products of Kirillov-Reshetikhin modules: First one constructs the quantum cluster algebra associated with the Q-system, a discrete integrable equation satisfied by non-commutative variables. The graded character of the fusion product of KR-modules is simply a coefficient of a particular quantum cluster monomial. This can be used together with the conserved quantities of the quantum Q-system, to obtain differential-difference equations for the characters of the fusion product. One use of this formulation is that it allows us to derive explicit formulas for the solutions in various stabilized semi-infinite limits, obtaining fermionic formulas for the characters of infinite-dimensional modules with non-zero central charge. This is joint work with P. Di Francesco.

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