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Algèbres non commutatives, théorie des représentations et fonctions spéciales
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Graphical calculus for quantum vertex operators

Graphical calculus provides a diagrammatic framework for performing topological computations with morphisms in (strict) ribbon categories. This amounts to a functorial identification of such morphisms with oriented diagrams colored by a ribbon category, such as the category of finite-dimensional representations of a quantum group. In this talk I will explain how the graphical calculus can be extended to a larger category of quantum group representations, encompassing the q-analog of the BGG category O. In particular, this extended framework allows to graphically represent quantum vertex operators on Verma modules, as well as morphisms depending on a dynamical parameter, such as dynamical R-matrices. I will demonstrate the potential of this approach by graphically deriving certain q-difference equations for normalized trace functions of N-point vertex operators. These include the dual q-KZB and Macdonald equations first obtained by Etingof and Varchenko, as well as some generalizations. This talk is based on joint work with Jasper Stokman and Nicolai Reshetikhin.