

The Quantum Group Structure of 2D Gravity and Minimal Models II: The Genus-Zero Chiral Bootstrap

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Received: 15 July 1993

Abstract: The chiral operator-algebra of the quantum-group-covariant operators (of vertex type) is completely worked out by making use of the operator-approach suggested by the Liouville theory, where the quantum-group symmetry is explicit. This completes earlier articles along the same line. The relationship between the quantum-group-invariant (of IRF type) and quantum-group-covariant (of vertex type) chiral operator-algebras is fully clarified, and connected with the transition to the shadow world for quantum-group symbols. The corresponding 3- j symbol dressing is shown to reduce to the simpler transformation of Babelon and one of the authors (J.-L. G.) in a suitable infinite limit defined by analytic continuation. The above two types of operators are found to coincide when applied to states with Liouville momenta going to ∞ in a suitable way. The introduction of quantum-group-covariant operators in the three dimensional picture gives a generalization of the quantum-group version of discrete three-dimensional gravity that includes tetrahedra associated with 3- j symbols and universal R -matrix elements. Altogether the present work and a previous parallel article gives the concrete realization of Moore and Seiberg's scheme that describes the chiral operator-algebra of two-dimensional gravity and minimal models.

1. Introduction

The holomorphic operator algebra that came out [1–4] by quantizing Liouville theory has been formulated in two equivalent bases. The original description of the references just given makes use of operators now denoted $^2 V_{m\hat{m}}^{(J\hat{J})}$. They are closely related with operators called IRF-chiral vertex operator in [9], which are associated with integrable models with solid-on-solid interactions around-the-face [10]. In the context

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² Our notations are the same as in previous articles [6–8]. We shall not spell them out again here. This work was supported in part by the European twinning Program, contract #540022