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BRAID GROUP REPRESENTATIONS ARISING FROM THE GENERALIZED CHIRAL POTTS MODELS

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Dedicated to Professor Heisuke Hironaka on his sixtieth birthday

A class of braid group representations are constructed for each non-singular bilinear form $B : (\mathbf{Z}/N\mathbf{Z})^l \times (\mathbf{Z}/N\mathbf{Z})^l \to \mathbf{Z}/N\mathbf{Z}$ with N odd. Associated link invariants are given as a Gauss sum involving the Seifert matrix and B. With a special choice of B these representations are Yang-Baxterized to the $\mathfrak{sl}(n)$ generalizations of the chiral Potts model discovered recently.

1. Introduction. The chiral Potts model [**1–4**] is a solvable lattice model whose Boltzmann weights are parametrized by a high genus curve and satisfy the star-triangle relation. The recent works [**5–11**] clarified the place occupied by this model in the updated catalogue of solvable lattice models. Like many other models the Boltzmann weights of the chiral Potts model constitute the R-matrices—intertwiners of representations of the quantum group $U_q(\mathfrak{g})$. If q is a root of unity and $\mathfrak{g} = \mathfrak{sl}(2)$ we get the chiral Potts model. In [**10, 11**] an $\mathfrak{sl}(n)$ generalization of the chiral Potts model has been obtained.

One of the most interesting features of solvable lattice models is its connection with the braid group representations. Given a solution to the Yang-Baxter equation, it is natural to ask the questions: Which representations of the braid groups arise therefrom and which invariants of links are obtained? The aim of this paper is to study the $\mathfrak{sl}(n)$ chiral Potts model from this point of view.

The trigonometric limit of the $\mathfrak{sl}(2)$ chiral Potts model has been known by Zamolodchikov and Fateev [**12**]. Kobayashi et al. [**13**] found that the braid group representations arising from it lead to link invariants related to the Seifert matrix. Goldschmidt and Jones [**17**] constructed a more general class of braid group representations by joining the Burau representation of the braid groups and the metaplectic representation of the symplectic groups over a finite field. They have also studied the corresponding link invariants and found the relation to the Alexander module and the Seifert matrix. In this paper

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