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Level 1 WZW Superselection Sectors

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Abstract. The superselection structure of the Wess–Zumino–Witten theory based on the affine Lie algebra $\widehat{so}(N)$ at level one is investigated for arbitrary N. By making use of the free fermion representation of the affine algebra, the endomorphisms which represent the superselection sectors on the observable algebra can be constructed as endomorphisms of the underlying Majorana algebra. These endomorphisms do not close on the chiral algebra of the theory, but we are able to obtain a larger algebra on which the endomorphisms close. The composition of equivalence classes of the endomorphisms reproduces the WZW fusion rules.

1. Introduction

In quantum physics there has been a continuous effort to define the theory from first principles – the axiomatic approach. One of the main developments in this respect has been algebraic quantum field theory [1, 2] (for further references see [3]).

For many physicists a major drawback of the axiomatic approach to quantum field theory has been the scarcity of interesting examples. On the other hand two-dimensional conformal field theory (conformal field theory, for short) has produced a wealth of non-perturbatively solvable field theories. In fact rational conformal field theory has reached such a stage of maturity that there are attempts at a classification of all rational conformal field theories. Thus it is very natural to try to incorporate some of the conformal field theory examples into the framework of algebraic field theory. So far this has been done only for the simplest rational conformal field theory – that of the Ising model – by Mack and Schomerus [4].

Central to the description of conformal field theory is the infinite-dimensional symmetry algebra of the theory. Since conformal field theories are solvable theories it is no surprise that a large part of the information about the theory is contained in the symmetry algebra – the kinematics. Another specific feature of conformal field theory is holomorphic factorization. As a consequence one is led to consider a one-

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