Commun. Math. Phys. 111, 479–500

Communications in
Mathematical
Physics

All NSR-Models in Terms of Bosonic Strings: An Explicit Derivation

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Abstract. We construct the open and closed string NSR-models in terms of $D \geqq 15$ bosonic string theories. All anticommuting NSR-operators are obtained after fermionizing 4 bosonic dimensions, and the NSR-Hilbert spaces are embedded as linear subspaces of the bosonic Hilbert spaces. We thus show the existence of various $10D$ supersymmetric sectors of the state spaces of $D=26$ consistent bosonic strings.

1. Introduction

String theories containing space-time-bosonic and -fermionic degrees of freedom [1] are known to be interpretable as $2D$ (two dimensional) quantum field theories. Those theories leading to space-time-fermions are based, in the old formalism of Green and Schwarz [1], on theories possessing a priori $2D$-fermions only. Because $2D$ bosonization and fermionization [2, 3] have become a tool of investigation in $2D$ models, one might wonder if it is possible to construct the NSR (Neveu-Schwarz-Ramond)-models [1] in terms of the consistent $D=26$ bosonic string theory. This has been anticipated by Freund [4] and partially achieved by the authors of [5][1].

In this paper, motivated by [5], we use $D \geqq 15$ closed compactified and open bosonic strings, which are not necessarily consistent, in order to construct explicitly all the operators characterizing the open and closed NSR-models in terms of purely bosonic ones. We make use of the fermionization method of [3] and of results on the quantum equivalence of various fermionic realizations of Virasoro algebras in two dimensions [6]. We describe the possible choices of subspaces of the bosonic Hilbert space which become the Hilbert spaces of the spinning string. That is, we construct $10D$ supersymmetric sectors of the closed or open $D=26$ bosonic string.

However, it turns out that it does not seem to be more efficient to calculate, for instance, superstring scattering amplitudes using results obtained from bosonic

[1] However, the NSR models were not treated by [5]