LIST OF PUBLICATIONS

GREGORY D. LANDWEBER

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G. D. Landweber, *Multiplets of representations and Kostant's Dirac operator for equal rank loop groups*, Duke Math. J., to appear, arXiv:math.RT/0005057.

ABSTRACT. Let $\mathfrak{g}$ be a semi-simple Lie algebra and let $\mathfrak{h}$ be a reductive subalgebra of maximal rank in $\mathfrak{g}$. Given any irreducible representation of $\mathfrak{g}$, consider its tensor product with the spin representation associated to the orthogonal complement of $\mathfrak{h}$ in $\mathfrak{g}$. Gross, Kostant, Ramond, and Sternberg recently proved a generalization of the Weyl character formula which decomposes the signed character of this product representation in terms of the characters of a set of irreducible representations of $\mathfrak{h}$, called a multiplet. Kostant then constructed a formal $\mathfrak{h}$-equivariant Dirac operator on such product representations whose kernel is precisely the multiplet of $\mathfrak{h}$-representations corresponding to the given representation of $\mathfrak{g}$.

We reproduce these results in the Kac-Moody setting for the extended loop algebras $\tilde{L}\mathfrak{g}$ and $\tilde{L}\mathfrak{h}$. We prove a homogeneous generalization of the Weyl-Kac character formula, which now yields a multiplet of irreducible positive energy representations of $L\mathfrak{h}$ associated to any irreducible positive energy representation of $L\mathfrak{g}$. We construct a $L\mathfrak{h}$-equivariant operator, analogous to Kostant's Dirac operator, on the tensor product of a representation of $L\mathfrak{g}$ with the spin representation associated to the complement of $L\mathfrak{h}$ in $L\mathfrak{g}$. We then prove that the kernel of this operator gives the $L\mathfrak{h}$-multiplet corresponding to the original representation of $L\mathfrak{g}$.

G. D. Landweber, *Harmonic spinors on homogeneous spaces*, Represent. Theory **4** (2000), 466-473, arXiv:math.DG/0005056.

ABSTRACT. Let G be a compact, semi-simple Lie group and H a maximal rank reductive subgroup. The irreducible representations of G can be constructed as spaces of harmonic spinors with respect to a Dirac operator on the homogeneous space G/H twisted by bundles associated to the irreducible, possibly projective, representations of H. Here, we give a quick proof of this result, computing the index and kernel of this twisted Dirac operator using a homogeneous version of the Weyl character formula noted by Gross, Kostant, Ramond, and Sternberg, as well as recent work of Kostant regarding an algebraic version of this Dirac operator.