

Heisenberg Parabolic Subgroup of $SO^*(10)$ and Invariant Differential Operators

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Abstract

Invariant differential operators play very important role in the description of physical symmetries. In a recent paper we started the systematic explicit construction of invariant differential operators. We gave an explicit description of the building blocks, namely, the parabolic subgroups and subalgebras from which the necessary representations are induced. Thus we have set the stage for study of different non-compact groups. In the present paper we continue the project of systematic construction of invariant differential operators on the example of the non-compact algebra $so^*(10)$. We use the maximal Heisenberg parabolic subalgebra $\mathcal{P} = \mathcal{M} \oplus \mathcal{A} \oplus \mathcal{N}$ with $\mathcal{M} = su(3,1) \oplus su(2) \cong so^*(6) \oplus so(3)$. We give the main multiplets of indecomposable elementary representations. This includes the explicit parametrization of the intertwining differential operators between the ERS. Due to the recently established parabolic relations the multiplet classification results are valid also for the algebras $so(p,q)$ (with $p+q=10$, $p \geq q \geq 2$) with maximal Heisenberg parabolic subalgebra: $\mathcal{P}' = \mathcal{M}' \oplus \mathcal{A}' \oplus \mathcal{N}'$, $\mathcal{M}' = so(p-2, q-2) \oplus sl(2, \mathbb{R})$, $\mathcal{M}'^{\mathbb{C}} \cong \mathcal{M}^{\mathbb{C}}$.