Commun. math. Phys. 1, 150—158 (1965)

On a Class of Generalized Poincaré Groups: Inhomogeneous $SL(n, C)$

By

H. BACRY*

CERN-Geneva

and

A. KIHLBERG

Chalmers University of Technology, Göteborg, and CERN - Geneva

Abstract. A certain class of non semi-simple Lie groups $ISL(n, C)$ based on $SL(n, C)$ is investigated. Its Lie algebra and invariants are determined. The connection between $ISL(2, C)$ and the Poincaré group is discussed.

Introduction

In recent time much attention has been paid to the problem of extending relativistically the $SU(6)$ supermultiplet theory which has been proposed independently by many authors [1—3]. Such an extension should have the property that the resulting invariance group contains the Poincaré group $\mathscr{P}$ as a subgroup and $SU(6)$ as a "little group". The latter assumption is motivated by the fact that $SU(6)$ is supposed to describe the spin as well as the $SU(3)$ internal degrees of freedom of the elementary system.

One such relativistic extension** is the "inhomogeneous $SL(6, C)$" group [hereafter denoted $ISL(6, C)$]. It is built in complete analogy with $ISL(2, C)$ which is isomorphic to the covering group of the Poincaré group $\mathscr{P}$. The group $ISL(2, C)$ contains as a subgroup $SL(2, C)$ — the group of 2×2 complex matrices with determinant 1 — which is isomorphic to the covering group of the proper Lorentz group. It contains also an invariant Abelian subgroup, the translation group, which is the additive group of 2×2 Hermitian matrices. Correspondingly the $ISL(6, C)$ group contains as a subgroup $SL(6, C)$, the group of 6×6 complex matrices with determinant 1, which constitutes the "homogeneous part" of $ISL(6, C)$. It also contains as an invariant Abelian subgroup the 36 dimensional additive group of 6×6 Hermitian matrices.

* On leave from Université de Marseille, Institut de Physique Théorique.

** The $ISL(6, C)$ group has been proposed independently by B. SAKITA [1], L. MICHEL (private communication), T. FULTON and J. WESS [4], and H. BACRY [5].