GROUP CONTRACTIONS AND STRATONOVICH-WEYL KERNELS

O. Arratia[1], M. Gadella[2] and M. A. del Olmo[2]

[1] Departamento de Matemática Aplicada a la Ingeniería
E.T.S.I.I. Universidad de Valladolid
E47011 Valladolid, Spain

[2] Departamento de Física Teórica, Universidad de Valladolid
E47011 Valladolid, Spain

Abstract

We study the Inönü-Wigner contractions of one dimensional groups and how kernels of Stratonovich-Weyl type, defined on coadjoint orbits of these groups, are transformed under contraction.

1. INTRODUCTION

The objective of the present paper is to investigate how the Inönü-Wigner contraction of kinematical groups affect their respective Stratonovich-Weyl kernels, by using some simple one dimensional examples. To begin with, we present the definition of the Stratonovich-Weyl correspondence as well as of some related concepts.[1-4]

The Stratonovich-Weyl (SW) correspondence is a mapping that assigns linear operators on a certain Hilbert space to functions defined on a phase space. The phase spaces here considered are coadjoint orbits of Lie groups of symmetries of a given physical system.

The ingredients to define a SW correspondence are:

1. A connected group G of symmetries of a given physical system and its representation group $\overline{G}$, which is the minimal connected and simply connected central extension of G such that any of the projective unitary irreducible representations (p.u.i.r.) of G can be lifted to a linear unitary irreducible representation (l.u.i.r.) of $\overline{G}$ and, reciprocally, every l.u.i.r. of $\overline{G}$ provides a p.u.i.r. of G.

2. The Kirillov method[5] for induced representations assigns to each of the coadjoint orbits of $\overline{G}$ one l.u.i.r. of $\overline{G}$. Orbits are classified into equivalence classes here called strata. Although the Kirillov method is valid for nilpotent groups only, one to one correspondences between orbits and l.u.i.r. are rather common. Two orbits belonging to the same strata induce respective representations that are formally identical although not equivalent.

Quantization and Infinite-Dimensional Systems
Edited by J-P. Antoine *et al.*, Plenum Press, New York, 1994