

The holomorphic Peter-Weyl theorem, Kirillovs character formula, and the Blattner-Kostant-Sternberg pairing

Johannes Huebschmann

By means of the orbit method we show that, for a compact Lie group, the Blattner-Kostant-Sternberg pairing map, with the constants being appropriately fixed, is unitary. Along the way we establish a holomorphic Peter-Weyl theorem for the complexification of a compact Lie group. Among our crucial tools is Kirillovs character formula. The basic observation is that the Weyl vector is lurking behind the Kirillov character formula as well as behind the requisite half-form correction on which the Blattner-Kostant-Sternberg pairing for the compact Lie group relies and thus produces the appropriate shift which, in turn, controls the unitarity of the BKS-pairing map. Our methods are independent of heat kernel harmonic analysis, which has been used by B. C. Hall to obtain a number of these results. The heat kernel analysis comes out of our approach as well.

These results yield the first steps within a joint research program with G. Rudolph and M. Schmidt aimed at developing, within the framework of stratified Kahler spaces, lattice gauge models for singular quantum mechanics. Within this program, we have already discovered a tunneling effect between singular strata.