Embedding of Dynamical Symmetry Groups of a Free Particle on AdS_3

J. Sadeghi[a,b*]

[a] *Institute for Studies in Theoretical Physics and Mathematics (IPM), P .O .Box 19395-5531, Tehran, Iran*

[b] *Sciences Faculty, Department of Physics, Mazandaran University, P O Box 47415-416, Babolsar, Iran*

July 16, 2005

Abstract

Using two different types of the ladder equations, we show that all quantum states corresponding to motion of a free particle on AdS_3 and S^3 splice into infinite direct sums. These direct sums corresponding to infinite and finite - dimensional Hilbert subspaces representing the different Lie algebras with the infinite- and finite-fold degeneracies. The ladder equation are simultaneously realized by the associated Gegenbaur functions. In addition, it is shown that the representation bases of Lie algebras with rank one, i.e. $gl(2,C)$, realize the representation of non-unitary parasupersymmetry algebra of arbitrary order. The representation of parasupersymmetry algebra by the Hilbert subspaces which describe the motion of a free particle on AdS_3 and S^3 with the dynamical symmetry groups is deduced as well.

*Email: pouriya@ipm.ir