

Central Extensions of Infinite Dimensional Lie Algebras

Jie Sun
, University of Alberta
jsun@math.ualberta.ca

Abstract

Symmetry often appears in nature, art design and philosophy. Lie groups are the natural concept for the mathematical description of symmetry in the physical world. The entire local structure of a Lie group is codified in its Lie algebra. Affine Kac-Moody algebras are infinite dimensional Lie algebras which have important applications in string theory. Kac's loop construction realizes all affine algebras by central extensions from finite dimensional simple Lie algebras. From a different point of view, loop algebras can also be thought as twisted forms. This perspective brings algebraic geometry into the study of Lie theory. In this talk I will give a bridge from symmetry to central extensions of infinite dimensional Lie algebras and conclude with constructions and automorphism groups of central extensions.