Arithmetic Deformation Theory of Lie Algebras

Arash Rastegar

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Abstract

This paper is devoted to deformation theory of graded Lie algebras over \mathbb{Z} or \mathbb{Z}_l with finite dimensional graded pieces. Such deformation problems naturally appear in number theory. In the first part of the paper, we use Schlessinger criteria for functors on Artin local rings in order to obtain universal deformation rings for deformations of graded Lie algebras and their graded representations. In the second part, we use a version of Schlessinger criteria for functors on the Artinian category of nilpotent Lie algebras which is formulated by Pridham, and explore arithmetic deformations using this technique.