

ABSTRACT

Let A be a differential graded algebra with cohomology ring H^*A . A graded module over H^*A is called *realisable* if it is (up to direct summands) of the form H^*M for some differential graded A -module M . Benson, Krause and Schwede have stated a local and a global obstruction for realisability. The global obstruction is given by the Hochschild class determined by the secondary multiplication of the A_∞ -algebra structure of H^*A .

In this thesis we mainly consider differential graded algebras A with graded-commutative cohomology ring. We show that a finitely presented graded H^*A -module X is realisable if and only if its $\mathfrak{p}$ -localisation $X_{\mathfrak{p}}$ is realisable for all graded prime ideals $\mathfrak{p}$ of H^*A .

In order to obtain such a local-global principle also for the global obstruction, we define the *localisation of a differential graded algebra A at a graded prime $\mathfrak{p}$ of H^*A* , denoted by $A_{\mathfrak{p}}$, and show the existence of a morphism of differential graded algebras inducing the canonical map $H^*A \rightarrow (H^*A)_{\mathfrak{p}}$ in cohomology. The latter result actually holds in a much more general setting: we prove that every smashing localisation on the derived category of a differential graded algebra is induced by a morphism of differential graded algebras.

Finally we discuss the relation between realisability of modules over the group cohomology ring and the Tate cohomology ring.