Algebra Seminar

The Foxby-morphism and derived equivalences

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Abstract: Suppose X is a quasi-projective scheme over a noetherian (Cohen-Macaulay) affine scheme $Spec(A)$, with $dim X = d$. In K-theory and related areas (Witt theory, Grothendieck-Witt theory), bounded chain complexes $G_\bullet$ of Coherent sheaves or locally free sheaves play an important role. One considers the category $Ch^b(Coh(X))$ (resp. $Ch^b(V(X))$) of bounded chain complexes of coherent sheaves (resp. of locally free sheaves). One also considers, the corresponding derived categories $D^b(Coh(X)$, $D^b(V(X))$, which is obtained by inverting the quasi-isomorphisms in the chain complex categories.

Given a chain complex map $L_\bullet \to G_\bullet$, between two complexes $L_\bullet$, $G_\bullet$, with extra information on homologies, one complex can be viewed as *an approximation to* the other. Given one such complex $G_\bullet$, constructing such a complex $L_\bullet$, with desired properties, and constructing a map $L_\bullet \to G_\bullet$ would be challenging. In the affine case $X = Spec(A)$, such a map was constructed by Hans-Bjorn Foxby (unpublished), several other versions of the same was given by others. In this lecture we implement the construction of Foxby to quasi-affine case and give applications. Intuitively, one can look at this implementation as a "graded" version of Foxby's construction.

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