

Algebraic Topology Seminar

Duality and Tilting for Commutative DG Rings

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Abstract: We study super-commutative nonpositive DG rings. An example is the Koszul complex associated to a sequence of elements in a commutative ring. More generally such DG rings arise as semi-free resolutions of rings. They are also the affine DG schemes in derived algebraic geometry. The theme of this talk is that in many ways a DG ring A resembles an infinitesimal extension, in the category of rings, of the ring $H^0(A)$.

I first discuss localization of DG rings on $\text{Spec}(H^0(A))$ and the cohomological noetherian property. Then I introduce perfect, tilting and dualizing DG A -modules. Existence of dualizing DG modules is proved under quite general assumptions. The derived Picard group $\text{DPic}(A)$ of A , whose objects are the tilting DG modules, classifies dualizing DG modules. It turns out that $\text{DPic}(A)$ is canonically isomorphic to $\text{DPic}(H^0(A))$, and that latter group is known by earlier work. A consequence is that A and $H^0(A)$ have the same (isomorphism classes of) dualizing DG modules.

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