

Department of Mathematics, BGU

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*On Wednesday, April ,27 2022*

*At 16:00 – 17:00*

*In 101-*

Amnon Yekutieli (BGU)

will talk about

## **A Constructive Approach to Derived Algebra, online meeting**

Abstract: In the last twenty years algebraic geometry has evolved rapidly, from the geometry of schemes and stacks, to the derived algebraic geometry (DAG) of today. The flavor of contemporary DAG is very homotopical, in the sense that is largely based on simplicial sets and Quillen model structures.

This talk is on another approach to DAG, of a very algebraic flavor, which avoids simplicial methods and model structures altogether. Instead, the fundamental concept is that of DG rings, traditionally called unital associative cochain DG algebras. DG rings are of two distinct kinds: noncommutative and commutative. These two kinds of DG rings interact, primarily through central DG ring homomorphisms; and this interaction is quite fruitful. The main tool for studying DG rings, DG modules over them, and the associated derived categories, is the construction and manipulation of resolutions. Hence “constructive approach”.

I will define the notions mentioned above, and state several results, among them: (1) The squaring operation and Van den Bergh's rigid dualizing complexes in the commutative arithmetic setting; (2) Theorems on derived Morita theory; (3) Duality and tilting for commutative DG rings. I will try to demonstrate that this constructive approach is very amenable to calculation. I will also mention work of Shaul, within this framework, on derived completion of DG rings and on the derived CM property.

The talk will conclude with a couple of conjectural ideas: (a) A structural description of the derived category of DG categories; (b) A construction of the cotangent DG module within the framework of commutative DG rings, without any arithmetic restrictions.

Some of this work is joint with J. Zhang, L. Shaul, M. Ornaghi and S. Singh.

Slides for the talk are available here:

<https://sites.google.com/view/amyekut-math-bgu/home/lectures/constr-der-algebra>

(updated 15 March (2022