Topology Seminar

Manuel Rivera

of Purdue University will be speaking on

Simplicial coalgebras under three different notions of weak equivalence

on October 17 at 4:30 in
MIT Room 2-131

Motivated by constructing algebraic models for homotopy types, I will discuss three different homotopy theories on the category of simplicial cocommutative coalgebras corresponding to the following notions of weak equivalence:

1. maps of simplicial coalgebras which become quasi-isomorphisms of differential graded (dg) coalgebras after applying the normalized chains functor

2. maps of simplicial coalgebras which become quasi-isomorphisms of dg algebras after applying the normalized chains functor followed by the dg cobar construction, and

3. maps of simplicial coalgebras which become quasi-isomorphisms of dg algebras after applying a localized version of the dg cobar construction.

Notion (1) was used by Goerss to provide a fully-faithful model for spaces up to F-homology equivalence, for a F an algebraically closed field. I will explain how (2), which is drawn from dg Koszul duality theory, corresponds to a linearized version of the notion of categorical equivalence between simplicial sets as used in the theory of quasi-categories. I will also explain how (3) leads to a fully-faithful model for the homotopy theory of simplicial sets considered up to maps that induce isomorphisms on fundamental groups and on the F-homology of the universal covers, for F an algebraically closed field. One of the key points is a sort of homological formulation of the fundamental group. This is based on joint work with G. Raptis and also on work with F. Wierstra and M. Zeinalian.

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