

## ***TOPOLOGY SEMINAR***

**Guest Speaker: Manuel Rivera**  
**University of Miami/CINVESTAV**

**Date:** Tuesday, January 15, 2019

**Time:** 4:00 PM

**Location:** 258 Hurley Hall



**Lecture Title:**

**Categorical and algebraic constructions related to path spaces**

***Abstract***

In this second talk I will embed the results stated in the first talk in the framework of higher category theory and explain their proofs in this language. This will be achieved by describing the relationship between the following three functors: 1) the path space functor and some of its relatives (based path space, based loop space, free loop space) 2) the cobar functor from the category of differential graded coalgebras to the category of differential graded algebras 3) the rigidification functor from simplicial sets to simplicial categories The functor 1) is a classical and important construction which appears all over through geometry, topology and homotopy theory. The functor 2) is based on an algebraic construction originally introduced by Adams, which, together with the bar construction establishes an important duality between coalgebras and algebras. The functor 3) was introduced by Lurie in order to compare different models for infinity categories (quasi-categories and simplicial categories) and it is the left adjoint of the homotopy coherent nerve functor. The key to relate these three functors is to introduce a cubical version of Lurie's rigidification functor. As a consequence, we will deduce an extension of a classical result of Adams that relates the cobar construction and the based loop space of a simply connected space to non-simply connected spaces. I will also discuss some applications of our results to the theory of infinity categories and infinity local systems. This is joint work with Mahmoud Zeinalian.