Topology Seminar

Marco Perez

of MIT will be speaking on

Computing Ext using n-projective modules

on September 29 at 4:30 in
MIT Room 2-131

We present a new model category structure on the category of chain complexes over a ring R, called the n-projective model structure, whose cofibrant objects are given by the class of chain complexes with projective dimension at most n (or n-projective complexes). One interesting application of this structure consists in finding another way to compute extension groups $\mathrm{Ext}^i_R(M, N)$ for every pair of left R-modules M and N, by using certain cofibrant and fibrant replacements of the sphere chain complexes $S^0(M)$ and $S^i(N)$, respectively. Recall that one normally computes $\mathrm{Ext}^i_R(M, N)$ by using either a left resolution of M by projective modules or a right resolution of N by injective modules. Somewhat surprisingly, there turn out to be many other ways to do it. We prove that one can use a left resolution of M by modules of projective dimension at most n. The disadvantage of doing so is that we use right resolutions of N by a class of modules which is hard to describe.

Reference: Pérez, M. *Homological dimensions and Abelian model structures on chain complexes* (to appear in *Rocky Mountain Journal of Mathematics*).