Topology Seminar

Dev Sinha

of The University of Oregon will be speaking on

Cohomology rings of extended powers and free infinite loop spaces

on September 23 at 4:30 in
MIT Room 2-131

(Joint work with Lorenzo Guerra and Paolo Salvatore) We calculate the cohomology ring structure of the extended powers of a space $D_n X$, which the homotopy orbits of its cartesian product X^n with respect to their standard symmetric group actions. While the mod-p homology of these constructions as well as a formulae for coproduct have been known, making calculations from this approach requires application of Adem relations as well as dualization, so applications of ring structure have been few. We previously found that a Hopf ring structure developed by Strickland and Turner provides the right framework for understanding cohomology rings of symmetric groups (the case when X is a point). Presently, we also develop a divided powers structure. Just as the homology is a free object, namely the free algebra over the Dyer-Lashof algebra on the homology of X, the cohomology is the free divided powers Hopf ring on the cohomology of X. A twist in the story is that at odd primes one must take coefficients in the direct representation and the sign representation to obtain a free answer. From extended powers we calculate ring structure for QX, and we understand Steenrod action from this viewpoint as well. We envision many applications.

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