Cohomology of Groups
Cohomologie des groupes
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ALEJANDRO ADEM, University of British Columbia
Free Finite Group Actions on Rational Homology Spheres

We apply methods from group cohomology to analyze free finite group actions on rational homology 3-spheres. This is joint work with Ian Hambleton.

NOE BARCENAS, UNAM- MEXICO
Stable Finiteness Properties of Infinite Discrete Groups

In this talk, I will discuss joint work with Dieter Degrijse (National University at Galway, Ireland), and Irakli Patchkoria (University of Bonn, Germany) concernig the relation between several cohomological dimensions for an infinite group. The talk includes methods of equivariant homotopy theory for inifinite discrete groups. An important corollary of the results is a geometric interpretation for the virtual cohomological dimension.

CHRISTOPHER BENDEL, University of Wisconsin-Stout
Good filtrations of tensor products

Let G be a simple, simply connected algebraic group over an algebraically closed field of prime characteristic. Recent work of Kildetoft and Nakano and of Sobaje has shown close connections between two long-standing conjectures of Donkin: one on tilting modules and the lifting of projective modules for Frobenius kernels of G and another on the existence of certain filtrations of G-modules. A key question related to these conjectures is whether the tensor product of a Steinberg module with a simple module admits a good filtration. This talk will discuss these connections and present some new results on this good filtration question.

JOSE CANTARERO, CONACYT - CIMAT Merida
Benson-Carlson duality for p-local finite groups

The augmentation map for the p-local cochains of a p-local finite group is Gorenstein in the sense of Dwyer-Greenless-Iyengar, which generalizes classical Benson-Carlson duality for cohomology rings of classifying spaces of finite groups. In this talk we will explain how to obtain this from the existence of embeddings of p-local finite groups in special unitary groups. This is joint work with N. Castellana and L. Morales.

JON CARLSON, University of Georgia
Separable rings in stable category over cyclic p-groups

We prove that the only separable commutative ring-objects in the stable module category of a finite cyclic p-group G are the ones corresponding to subgroups of G. We also describe the tensor-closure of the Kelly radical of the module category and the stable module category of any finite group. This is joint work with Paul Balmer.

THOMAS CHURCH, Stanford University
Asymptotic representation theory over $\mathbb{Z}$ and cohomology of arithmetic groups

Representation theory over $\mathbb{Z}$ is famously intractable, but "representation stability" provides a way to get around these difficulties, at least asymptotically, by enlarging our groups until they behave more like commutative rings. Moreover, it turns out that important questions in topology, number theory, representation theory, and other fields correspond to asking whether familiar algebraic properties hold for these "rings". I'll explain how these connections work, with a focus on the applications to cohomology of arithmetic groups. No knowledge of representation theory required.

CHRISTOPHER DRUPIESKI, DePaul University

Some graded analogues of one-parameter subgroups and applications to the cohomology of graded group schemes

Throughout, we work over a field of characteristic $p > 0$. Let $\mathbb{G}_{a(r)}$ denote the r-th infinitesimal Frobenius kernel of the additive group scheme $\mathbb{G}_a$. In 1997, Suslin, Friedlander, and Bendel showed that the cohomology variety of a height-r infinitesimal group scheme G identifies with the variety of homomorphisms $\nu : \mathbb{G}_{a(r)} \to G$. They called this the 'variety of infinitesimal one-parameter subgroups of height $\leq r$ in G.' The SFB theorem provided a direct analogy for infinitesimal group schemes of Quillen's 1971 stratification theorem for finite groups, which roughly states that the cohomology variety of a finite group G is determined by the varieties of the elementary abelian p-subgroups of G. Later, Friedlander and Pevtsova unified the results of Quillen and SFB through the machinery of π-points.

In this talk I will discuss joint work with Jonathan Kujawa in which we begin extending the results of SFB to the broader context of graded group schemes, or equivalently, to finite-dimensional cocommutative Hopf superalgebras (i.e., Hopf algebras in the braided monoidal category of $\mathbb{Z}/2\mathbb{Z}$-graded vector spaces). In particular, I will discuss a family of finite supergroup schemes that may play the role of SFB's infinitesimal one-parameter subgroups, and I will discuss our progress in using this family of supergroup schemes to describe (up to a finite morphism) the cohomology variety of $GL_{m|n(r)}$, the r-th Frobenius kernel of the general linear supergroup $GL_{m|n}$.

IAN HAMBLETON, McMaster University

Group cohomology with group ring coefficients

For an infinite discrete group G, the group cohomology $H^*(G; ZG)$ with coefficients in the integral group ring inherits a ZG-module structure. We are interested in obtaining information about this natural ZG-module in low dimensions, or for special classes of groups such as right-angled Artin groups. The results have applications in describing the homotopy type of closed 4-manifolds with a given finitely presented group G as fundamental group.

RITA JIMENEZ, Universidad Nacional Autónoma de México

On the cohomology of spaces of maximal tori in classical Lie groups

In this talk I will explain how point-counting over finite fields can be used to obtain cohomological information about certain spaces of maximal tori in classical Lie groups. In particular, it can be used to obtain "twisted homological stability" and to show that the stable Betti numbers are quasipolynomial and satisfy linear recurrence relations. This is joint work with Jason Fulman and Jennifer Wilson.

GABRIEL MINIAN, Universidad de Buenos Aires

A new test for studying asphericity of group presentations and Whitehead's asphericity question

I will present a new test for studying asphericity of 2-complexes and group presentations. This test was recently introduced in a joint paper with Jonathan Barmak. Our I-test provides a criterion for deciding when a presentation of an indicable group is aspherical. I will compare the I-test with the different variations of the classical weight tests (such as Gersten's weight test) and show how to use our methods to prove asphericity in cases where the known tests fail. Finally I will apply these new methods to investigate some cases of Whitehead's asphericity question and a conjeture of Ivanov, which is related to Whitehead's question and Kaplansky problem on zero divisors.

DANIEL NAKANO, University of Georgia
Bilinear and Quadratic Forms of Rational Modules of Split Reductive Groups

The representation theory of semisimple algebraic groups over the complex numbers (equivalently, semisimple complex Lie algebras or Lie groups, or real compact Lie groups) and the question of whether a given complex representation is symplectic or orthogonal has been solved since at least the 1950s. Similar results for Weyl modules of split reductive groups over fields of characteristic different from 2 hold by using similar proofs. I will present analogues of these results for simple, induced and tilting modules of split reductive groups over fields of prime characteristic as well as a complete answer for Weyl modules over fields of characteristic 2. Our study involves using the cohomology for algebraic groups.

This represents joint work with Skip Garibaldi.

JULIA PEVTSOVA, University of Washington
Detection of nilpotence and projectivity for finite unipotent group schemes

For a finite group G, classical theorems of Quillen and Chouinard tell us how to detect whether a cohomology class is nilpotent or whether a module is projective: one has to restrict to elementary abelian subgroups of G. For connected finite group schemes, the detecting family consists of one-parameter subgroups as shown by Suslin, Friedlander, and Bendel. In this talk I'll describe what plays the role of elementary abelian subgroups for finite unipotent super group schemes. Some interesting new phenomena arise when one introduces grading; the theory of Dieudonne modules plays an important role.

This is a preliminary report on joint work with D. Benson, S. Iyengar, and H. Krause.

DANIEL JUAN PINEDA, CCM-UNAM
On the geometric dimension for classifying spaces for mapping class groups

We will describe a bound for geometric dimension of the classifying spaces for actions with isotropy in the class of virtually cyclic subroups for mapping class groups of surfaces.

DEV SINHA, University of Oregon
Cohomology of symmetric and alternating groups

We present the mod-two cohomology of symmetric and alternating groups as (almost) Hopf rings under both cup product and a second product given by induction/transfer. This presentation in particular determines the additive and cup product structures of individual groups. In addition to this almost Hopf ring structure, which is present in the cohomology or representation theory of series of finite groups with suitable embeddings $G_i \times G_j \to G_{i+j}$, we employ Fox-Neuwirth resolutions, which also arise in the study of (∞, n) categories.

DAVID SPREHN, University of Copenhagen
Stable Homology of Classical Groups

I'll discuss some new results with Nathalie Wahl on the stable range and stable values of the homology of classical groups (general linear, symplectic, and orthogonal).

In particular, we recover and extend Quillen's 'lost proof' of slope-1 homology stability, which leverages the vanishing of the coinvariants of the Steinberg module and its relative counterpart.

We also study the (lack of) p-torsion in the stable homology of classical groups over a finite field of characteristic p.

BERNARDO URIBE, Universidad del Norte
Morita Equivalence of pointed fusion categories

The information that defines a pointed fusion category is a finite group and a 3-cocycle with values in U(1). In this talk I will give the necessary and sufficient conditions for two of these categories to be Morita equivalent. I will use this description to count the Morita equivalence classes of pointed fusion categories of groups of order 8.