# Vanderbilt University, Department of Mathematics
# Nashville, Tennessee, USA

# Workshop

## ON

# NIL PHENOMENA IN TOPOLOGY

## APRIL 14 AND 15, 2007

## Abstracts of Talks

Jim Davis (Indiana University)
Title: Some Remarks on Nil groups in Algebraic K-theory

Abstract: We explains consequences of recent work of Frank Quinn for computations of Nil groups in algebraic K-theory, in particular the Nil groups occurring in the K-theory of polynomial rings, Laurent polynomial rings, and the group ring of the infinite dihedral group.

Ian Hambleton (McMaster University)
Title: Computations of the Bass Nil groups

Joachim Grunewald (Munester)
Title: Operations on Nil-terms

Abstract: (joint work with John Klein and Tibor Macko) We shall discuss Frobenius and Verschiebung operations on A- and K-theoretic Nil-terms.

Daniel Juan-Pineda (IM-UNAM, Morelia)
Title: Vanishing and non-vanishing results for Nils

Abstract: I will present the radical behaviour of nil groups for finite group rings: in special cases lower nils vanish, on the other hand higher nils of he simplest group rings are never trivial. I will present some general cases where higher nils do not vanish and some conjectures relating these phenomena.

Jean-Francis Lafont (Ohio State University)
Title: Lower algebraic K-theory of lattices in hyperbolic space, I

Abstract: Classifying spaces with isotropy in prescribed families of subgroups have acquired a great deal of importance due to various isomorphism conjectures for assembly maps. Classifying spaces for proper actions (corresponding to the family of finite subgroups FIN) have been extensively studied, and "good" models are known for a wide range of groups. In contrast, much less is known about classifying spaces with isotropy in the family of virtually cyclic subgroups (VC). These latter spaces show up in the Farrell-Jones isomorphism conjectures. We will discuss the notion of adapted collections of subgroups for nested pairs of families of subgroups (think of FIN contained within VC). In the presence of an adapted collection, we will see how a classifying space for the smaller family can be modified to give a classifying space for the larger family. The prototypical example is the case of relatively hyperbolic groups, where we will explain how to construct an adapted family for the pair (FIN,VC). Finally, we will explain how in the presence of an adapted family, recent work of Luck-Weiermann can be used to exhibit a splitting for the homology of the classifying space for the larger family.

Ivonne Ortiz (Miami University, Ohio)
Title: Lower algebraic K-theory of lattices in hyperbolic space, II

Abstract: Lattices in hyperbolic space are examples of hyperbolic groups (in the case of uniform lattices), or relatively hyperbolic groups (in the case of non-uniform lattices). Furthermore, the Farrell-Jones isomorphism conjecture (for lower algebraic K-theory) is known to hold for these groups. This implies that for these groups, the lower algebraic K-theory coincides with the homology of the classifying spaces with isotropy in the family VC (and efficient models for these classifying spaces were described in the first lecture). Focusing on Coxeter groups arising as lattices in hyperbolic 3-space, we now have the ingredients necessary to compute the lower algebraic K-theory of (the integral group rings of) these groups. These computations will be illustrated for several particular examples of such lattices. In the Coxeter notation, the lattices that will be discussed are (1) the non-uniform examples [3,4^{1,1}] and [5,3^[3]], (2) the uniform examples [(3^3,5)] and [(3,4)^[2]]. These examples were chosen to illustrate the various subtleties that arise in the computations of the lower-algebraic K-theory for all 32 examples of hyperbolic 3-simplex reflection groups.

Erik Pedersen (Binghamton and Copenhagen)
Title: Identifying assembly maps

Abstract: I discuss various assembly maps and why they are the same maps. This represents joint work with Ian Hambleton.

Stratos Prassidis (Canisius)
Title: Nils of pseudoisotopies

Abstract: We will give a geometric definition of Nil-groups in stable pseudoisotopy theory. The construction generalizes the controlled methods used in proving the Bass-Heller-Swan formula in K-theory. Also, we will compare the two splittings. This is joint work with Chris Kinsey.

Andrew Ranicki (Edinburgh)
Title: Nilpotence = torsion

Abstract: The modern proofs of the algebraic K- and L-theory splitting theorems for generalized free products and HNN extensions are based on the noncommutative localization exact sequence of Amnon Neeman and the speaker (Geometry & Topology, 2004). The talk will describe how nilpotent objects arise as torsion modules in the exact sequence, probably confining itself to just the polynomial extension case.

Ross Staffeldt, (New Mexico State University)
Title: The connecting homomorphism for K-theory of generalized free products

Abstract: For a generalized free product situation where R is the generalized free product of rings B and C over a common subring A the connecting homomorphism from the K-theory of R to the K-theory of A and the Nil-term is of interest.
I will describe how to use techniques from Waldhausen's approach to algebraic K-theory to develop a framework in which it is possible to describe this connecting homomorphism explicitly.

Bruce Williams (University of Notre Dame)
Title: From Geometric to Algebraic Nil

Abstract: The geometric nil for automorphisms of manifolds can be computed (in the concordance stable range) in terms of nil for algebraic functors, namely nil for K-theory and TC.