ABSTRACTS

A. Adem

Title: Group Actions: Old Questions, Some New Answers

Abstract:
In this lecture I will discuss recent work on constructing group actions, building on classical work on spherical space forms. Topics will include extensions to infinite groups and to groups of higher rank. Particular attention will be given to rank two groups, where the objective is to construct free actions on a product of two spheres. Recent contributions by Adem-Davis-Unlu, Jackson and Hambleton will be described.

Markus Banagl

Title: Topological Invariants of Stratified Maps.

Abstract:
The decomposition theorem of Beilinson-Bernstein-Deligne asserts that the pushforward of the intersection chain sheaf under a proper algebraic map between complex algebraic varieties is isomorphic to an orthogonal sum of twisted intersection chain sheaves associated to the various strata of the target. An analog in the topological realm has been developed by Cappell-Shaneson: On a space with only even-codimensional strata, any self-dual sheaf is cobordant to an orthogonal sum of twisted intersection chain sheaves. In sharp contrast to this result, we prove that on a space with only odd-codimensional strata, any self-dual sheaf is cobordant to one intersection chain sheaf associated to the top stratum: the strata of odd codimension do not contribute any terms. As a consequence, we obtain formulae for the pushforward of characteristic classes under a stratified map whose target need not satisfy the Witt space condition.

Ralph Cohen

Title: "Intersection theory in spaces of paths and loops in manifolds"

Abstract:
In this lecture I will review the Chas-Sullivan intersection product in the homology of loop spaces of manifolds, and show how it generalizes to give an open and closed string, topological quantum field theory. This uses graph theoretic models for the moduli space of Riemann surfaces. I will also discuss recent advances in string topology, such as the homotopy invariance of the operations, and relations between the string topology of a manifold and the Gromov-Witten theory of its cotangent bundle.

D. Crowley

Title: Quadratic coefficient systems in surgery.

Abstract:
The classical L-groups of Wall maybe identified with bordism classes of certain bordisms over an appropriate manifold M. I will discuss how a more general notion of quadratic form can be used to classify a larger class of bordisms over M and some new classifications of manifolds which arise.

J. F. Davis

Title: Propagation of group actions and actions on a product of spheres.

ABSTRACT: I will summarize the technique of propagation of group actions and discuss joint work with A. Adem and O. Unlu constructing free actions on a product of spheres using surgery theory. Among other things, we show that a rank 2 p-group with $p > 3$ acts freely on a product of two spheres.

B. Dundas

Title: 2-vector bundles and K-theory

Abstract:
In this talk I will discuss the approach (joint with Baas and Rognes) giving a cohomology theory whose geometrical content is a pure generalization of complex K-theory, but whose telescopic complexity (most likely) is the same as elliptic cohomology.

The connection to Segal's elliptical objects is still conjectural, and is related to the existence or choice of "reasonable" determinants for $\E_\infty$ ring spectra (these generally do not exist) as part of a connective structure of our bundles.

Roughly, the cohomology theory is what you get if, in the definition of complex K-theory, you replace the complex numbers (with addition and multiplication) with the category of finitely generated complex vector spaces (with sum and tensor).

In order to get the right result, one needs to be careful what one means by an equivalence: if one chooses the isomorphisms one essentially just get gerbes.

In the end, we are left with an interpretation of our cohomology theory in terms of (virtual) bundles with fibers "2-vector spaces".

If time permits, I will discuss some of the categorical details behind the solutions of questions left open in the paper "Two-vector bundles and forms of elliptic cohomology".

Greg Friedman

Title: Cobordism of (high dimensional) disk knots

Abstract:
The cobordism theory of smooth high-dimensional sphere knots was completely solved (or at least turned into an algebraic problem) in the 1960s through the work of Kervaire, who showed that all even-dimensional knots are cobordant, and J. Levine, who showed that the cobordism type of an odd-dimensional knot is determined by its Seifert matrix. In fact, two odd-dimensional knots are cobordant if and only if their Seifert matrices satisfy a certain algebraic cobordism equivalence.

We study the cobordism theory of disk knots, i.e. PL locally-flat proper embeddings $D^{n-2}\into D^n$. Disk knots are very closely related to sphere knots with point singularities, and our study is motivated by an attempt to understand singular knots in general. We study both cobordism of disk knots and cobordism rel boundary, holding the boundary sphere knot fixed. It is fairly easy to classify cobordisms except in the odd-dimensional rel boundary case. In this case, we introduce a disk knot analogue of the Seifert matrix and show that it also provides a classification. Further, we study the realization of matrix invariants given a fixed boundary knot. The question is settled in all cases except those for which the middle-dimensional Alexander module of the boundary knot has 2-torsion. The solution is provided by defining a Blanchfield pairing for disk knots and determining close ties with Farber-Levine torsion pairing of the boundary knot (in fact the former determines the latter under certain connectivity assumptions).

N. Ganter

Title: "Orbifold genera, product formulas and power operations"

A. Grinberg

Title: Resolutions of p-Stratifolds with Isolated Singularities

Abstract:
Recently M. Kreck introduced a class of stratified spaces called p-stratifolds. He defined and investigated resolutions of p-stratifolds analogously to resolutions of algebraic varieties. We'll study a very special case of resolutions, so called optimal resolutions, for p-stratifolds with isolated singularities. We give necessary and sufficient conditions for existence and analyze their classification.

J. Grodal

Title: Finite loop spaces and p-compact groups

Abstract:
p-compact groups have recently been classified when the prime p is odd by Andersen-Grodal-Moeller-Viruel. The theorem says that there is a 1-1 correspondence between p-compact groups and finite reflections groups over the p-adic integers. For the prime 2 this formulation needs modification in that the reflections groups need to be replaced by 2-adic root data (which needs to be defined!), and the classification is still conjectural. In my talk I'll first give an introduction to p-compact groups, followed by an examination of the case p=2 in more detail. This last part is joint work with Kasper Andersen.

Bruce Hughes

Title: Local rigidity of ends of trees

Abstract:
The geometry of a tree at infinity gives rise to a noncommutative end space associated with the ultrametric end space of the tree. When the end space of the tree satisfies a local rigidity condition, the noncommutative end space is an AF C*-algebra. I will discuss local rigidity, give examples and make suggestions about what to do when the condition is missing.

N. Kitchloo

Title: Loop spaces and Duality

Abstract: We construct a model for the Atiyah dual of the free loop space as an equivariant pro-spectrum.
We use this to calculate equivariant genera of the Loop space.

J. Klein

"The Complement Formula"

Given an embedding of one manifold (or Poincare space) in another, is there a homotopy theoretic formula for the complement? The answer is yes if the the codimension is sufficiently large. I will explain this formula and some of its ramifications.

One application is a new proof of the Whitney embedding theorem in the Poincare duality category.

W. Lueck (Muenster)

Title: Computation of K- and L-groups of group rings and group C^*algebras

Abstract:
We explain methods how to compute the source of the assembly map appearing in the Farrell-Jones and Baum-Connes Conjecture. This gives rather complete formulas for the rational K- and L-groups of infinite groups in terms of group homology using equivariant Chern characters. Integral computations can be done in special cases and use geometric methods to understand the quotient space of the classifying space for proper groups actions.

F. Quinn

Title: Controlled algebraic K-theory and the induction conjecture.

A. Ranicki

The title of my talk in Banff will be
"Noncommutative localization in surgery theory"
Abstract:
The talk will describe some of the applications of noncommutative localization in surgery theory.

H. Reich

Algebraic K-Theory of Group Rings and Topological Cyclic Homology

The talk reports on joint work with J. Rognes, W. LŸck and M. Varisco. We use topological cyclic homology and the cyclotomic trace to detect elements in the rationalized higher algebraic K-Theory of integral group rings. Modulo a conjecture in number theory (known as the Schneider Conjecture -- a higher analogue of the Leopoldt Conjecture) and under mild homological finiteness conditions on the group we prove that the assembly map for connective algebraic K-Theory and the family of virtually cyclic groups is rationally injective. This vastly generalizes a result of Bškstedt, Hsiang and Madsen and leads to a concrete description of a large direct summand inside the algebraic K-Theory of an integral group ring. Along the way we also prove integral splitting and isomorphism results for THH- and TC-assembly maps.

Oliver Roendigs

Title: Algebraic K-theory of spaces in terms of spectra

Abstract:
Waldhausen's algebraic K-theory of spaces has a close connection to the pseudo-isotopy theory of manifolds. On the other hand, it can be formulated entirely in terms of homotopy theory. The algebraic K-theory of a connected space X is equivalent to the algebraic K-theory of a structured ring spectrum, the group ring spectrum S^0[G(X)] with coefficients in the sphere spectrum, where G(X) is the Kan loop group of X. In this sense, algebraic K-theory of spaces is just algebraic K-theory of "rings".

N. Wahl

Title: Mapping class groups in dimension 2 and 3 and the automorphisms of free groups.

Abstract:
Action on the fundamental group gives a natural map from the mapping class group of a punctured surface to the corresponding automorphism of free group. We will explain how the mapping class groups of certain 3-dimensional manifolds can help us to study this map.

B. Williams

Title: Homotopy Intersection Theory and Parametrized Fixed Point Theory

Abstract:
Question: Given a fiber bundle $E \to B$ plus an endomorphism ϕ of E covering the identity map of $B,$ when is ϕ fiber homotopic to a map with no fixed points?

In this talk we'll define a {\it family version} of the Lefschetz invariant $L(p.\phi)$ such that when $dim E > 2dim B +2$ the vanishing of $L(p.\phi)$ implies the answer to the question is yes. The proof uses a refined version of intersection pairings, Euler classes, and new proofs of results of Hatcher-Quinn.
