Homotopy Theory and Its Applications
Abstracts

Saturday 10:15-12:15

Julie Bergner, University of California, Riverside
Anna Marie Bohmann, Northwestern University
Kristine Bauer, University of Calgary
Kate Ponto, University of Kentucky

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Sunday 8:30-10:30

Angelica Osorno, University of Chicago
Rosona Eldred, University of Illinois, Urbana-Champaign
Emily Riehl, Harvard University
Teena Gerhardt, Michigan State University

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**Algebraic Structures from diagrams**
Julie Bergner, University of California, Riverside

We investigate ways to understand various algebraic structures via diagrams satisfying a Segal-type condition. Such diagrams have been used extensively for monoid or category structures in models for $(\infty,1)$-categories, but here we look at ways to understand other kinds of algebraic objects. This project is joint work with Philip Hackney.

**The $S^1$ equivariant generating hypothesis**
Anna Marie Bohmann, Northwestern University

Abstract: Freyd's generating hypothesis is a long-standing conjecture in stable homotopy theory, which says that the stable homotopy groups functor is faithful on finite spectra. We give the appropriate generalization to the equivariant context, where we prove that for finite groups of equivariance, the situation is similar to the nonequivariant case. For circle actions, the picture is strikingly different: even the rational $S^1$ equivariant generating hypothesis fails.

**Spectral sequences of operad algebras**
Kristine Bauer, University of Calgary

Since the 1950's, topologists have understood how to use the multiplicative structure of a spectral sequence of algebras to aid in the study of the spectral sequence. In good cases, such a spectral sequence converges as an algebra, so that the $E^\infty$ page again has multiplicative structure. In this talk, we explain what it means for a spectral sequence to be a sequence of operad algebras. We give conditions which ensure that the sequence converges as operad algebras and look at examples of how this can be useful in detecting certain (co)homological operations. This is joint work with Laura Scull.

**Coincidence invariants**
Kate Ponto, University of Kentucky

A fixed point of a continuous endomorphism f of a topological space X is a point x in X so that f(x)=x. A coincidence point of a pair of continuous maps f and g from X to Y is a point x in X so that f(x)=g(x). Coincidence points are a natural generalization of fixed points. I will explain how the formal structure that describes the Lefschetz fixed point theorem also describes a corresponding theorem for (some) coincidence invariants.

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**Spectra associated to symmetric monoidal bicategories**
Angelica Osorno, University of Chicago

In this talk, we show how to construct a spectrum from a symmetric monoidal bicategory, using Segal's Gamma-spaces. As an example, we use this machinery to show the group-like symmetric monoidal bigroupoids model stable homotopy 2-types.

**Partial Approximation Towers for Functors**
Rosona Eldred, University of Illinois, Urbana-Champaign

We call attention to constructions in Goodwillie's Calculus of homotopy functors that lead to a new partial approximation tower, and its relationship with certain cosimplicial resolutions. For functors of spaces and spectra, this equivalence gives a greatly simplified construction for the Taylor tower of functors under fairly general assumptions.

**Algebraic model structures**
Emily Riehl, Harvard University

Cofibrantly generated model categories have an algebraic model structure, which is a Quillen model structure in which the functorial factorizations define monands and comonads, inducing a fibrant replacement monad and a cofibrant replacement comonad. In the presense of this structure, the (co)fibrations can be regarded as (co)algebras for the (co)monad. The (co)algebra structures witness the fact that a particular map is a (co)fibration and can be used to construct a canonical solution to any lifting problem. For example, the algebraic structure for Hurewicz fibrations is a path lifting function; for Kan fibrations it is a choice of filler for all horns. We describe a few features of this theory and then define and characterize algebraic Quillen adjunctions, in which the funtors must preserve algebraic (co)fibrations, not simply ordinary ones. We conclude with a brief discussion of new work defining monoidal and enriched algebraic model structures that gives particular emphasis to the role played by ``cellularity'' of certain cofibrations.

**Computations in Algebraic K-Theory**
Teena Gerhardt, Michigan State University

Techniques from equivariant stable homotopy theory are often key to algebraic K-theory computations. In this talk I will describe joint work with Vigleik Angeltveit, Mike Hill, and Ayelet Lindenstrauss, yielding new computations of algebraic K-theory groups using equivariant methods. In particular, we consider the K-theory of truncated polynomial algebras in several variables.