Program
West Coast Algebraic Topology Summer School
September 6-8, 2013
The University of Oregon

THEORY AND APPLICATIONS OF HIGHER CATEGORIES

The 2013 West Coast Algebraic Topology Summer School (WCATSS) `http://wcatss13.wikispaces.com` will be on the theory and applications of ∞-categories. Our goal is to introduce participants to the ideas and language of ∞-categories and to highlight some cutting edge applications in an informal atmosphere. There has been an incredible amount of deep work done in this area. This program does not seek to serve as a complete survey or list of references.

Talks will be divided amongst the program participants based on the suggested outline below. The first portion of the program will consist of a series of lectures sketching the foundations of the theory. The second half will focus on applications, with talks depending on the interests of the participants.

1. FOUNDATIONS

We will begin the program with several talks by participants introducing and developing the machinery necessary to appreciate the applications.

1.1. **Background on model categories, simplicial sets, and Γ-spaces.**
   (1) Dwyer, W.G. and Spalinski, J. *Homotopy theories and model categories.*
       `http://folk.uio.no/paularne/SUPh05/DS.pdf`

1.2. **Introductory/survey articles on $(\infty, 1)$-categories.**
   (1) Lurie, Jacob.
      (a) *What is an $(\infty, 1)$-category?*
          `http://www.ams.org/notices/200808/tx080800949p.pdf`

      (b) Chapter 1 of *Higher topos theory.*
          `http://www.math.harvard.edu/~lurie/papers/croppedtopoi.pdf`

   (2) Camarena, Omar Antolin. *A whirlwind tour of $(\infty, 1)$-categories.*
       `http://www.math.harvard.edu/~oantolin/papers/infinity-survey.pdf`

   (3) Bergner, Julie.
      (a) *A survey of $(\infty, 1)$-categories.*
          `http://www.math.ucr.edu/~jbergner/OneInfty.pdf`

      (b) *Workshop on the homotopy theory of homotopy theories.*
          `http://www.math.ucr.edu/~jbergner/HomotopyWorkshop.pdf`

   (4) Groth, Moritz. *A short course on ∞-categories.*
       `http://qft.mimuw.edu.pl/InfinityCategories.pdf`

   (5) Tanaka. *An introduction to ∞-categories.*
       `http://pages.uoregon.edu/njp/tanaka.pdf`

1.3. **Models for $(\infty, 1)$-categories.**
 (1) Rezk, Charles. *A model for the homotopy theory of homotopy theory.*
     `http://arxiv.org/pdf/math/9811037.pdf`

 (2) Bergner, Julie. *Three models for the homotopy theory of homotopy theories.*
     `http://www.math.ucr.edu/~jbergner/SimpCatCSS.pdf`

 (3) Joyal, André. *Notes on quasicategories.*
     `http://ivanych.net/doc/NotesOnQuasicategories_Joyal.pdf`

2. Applications

The second portion of the summer school will focus on some applications of ∞-categories. We have a few ideas here, but we emphasize that this list is not meant to be complete and the applications presented will depend on the everyone's interests.

2.1. **Stable $(\infty, 1)$-categories.**
 (1) Lurie, Jacob.
   (a) *Stable infinity categories.*
       `http://arxiv.org/pdf/math/0608228v5.pdf`

   (b) *Higher algebra.*
       `http://www.math.harvard.edu/~lurie/papers/HigherAlgebra.pdf`

 (2) Schwede, Stefan and Shipley, Brooke. *Classification of stable model categories.*
     `http://hopf.math.purdue.edu/Schwede-Shipley/class.final.pdf`

2.2. **The cobordism hypothesis.**
 (1) Bergner, Julie. *Models for (∞, n)-categories and the cobordism hypothesis.*
     `http://www.math.ucr.edu/~jbergner/InftynCob.pdf`

 (2) Freed, Daniel. *The cobordism hypothesis.*
     `http://arxiv.org/pdf/1210.5100.pdf`

 (3) Lurie, Jacob. *On the classification of topological field theories.*
     `http://www.math.harvard.edu/~lurie/papers/cobordism.pdf`

 (4) Teleman, Constantin. *Five lectures on topological field theory.*
     `http://math.berkeley.edu/~teleman/math/barclect.pdf`

2.3. **The infinity categorical model of Thom spectra.**
 (1) Ando, Blumberg, Gepner, Hopkins, Rezk. *Units of ring spectra and Thom spectra.*
     `http://arxiv.org/pdf/0810.4535v3.pdf`

 (2) Ando, Blumberg, Gepner.
   (a) *Twists of K-theory and TMF.*
       `http://arxiv.org/pdf/1002.3004v2.pdf`

   (b) *Parametrized spectra, multiplicative Thom spectra, and the twisted Umkehr map.*
       `http://arxiv.org/pdf/1112.2203v1.pdf`

2.4. **Algebraic K-theory.**

(1) Blumberg, Gepner, Tabuada. *A universal characterization of higher algebraic K-theory.*
http://arxiv.org/pdf/1001.2282v4.pdf

(2) Groth and Raptis. *∞-categories and their applications.*
http://www.math.uni-bonn.de/~mgroth/AGWS1112.pdf