Jonathan S. Beardsley

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Research Summary

I use homotopy theory and category theory to better understand concepts and structures from topology, geometry, and algebra. I have ongoing projects in the areas of derived noncommutative geometry, Galois and descent theory of structured ring spectra, chromatic homotopy theory, categorical invariants of singular knots, and Koszul duality.

Education

- Ph.D. in Mathematics, Johns Hopkins University, 2016
  Thesis Advisor: Jack Morava
  Thesis Title: "Coalgebraic Structure and Intermediate Hopf-Galois Extensions of Thom Spectra in Quasicategories"
- B.S. in Mathematics, University of Central Florida, 2010
  Thesis Advisor: Piotr Mikusiński
  Thesis Title: "A Sheaf of Boehmians"

Employment

- University of Nevada, Reno, Assistant Professor, 2020 – present
- Georgia Institute of Technology, Visiting Assistant Professor. 2019 – 2020
- University of Washington, Acting Assistant Professor, 2016 – 2019
- Johns Hopkins University, Graduate Teaching Assistant, 2010 – 2016

Writing

1. "Koszul Duality in Higher Topoi,"
   (`arXiv:1909.11724`)
2. "Thom Objects are Cotorsors,"
   (`arXiv:1810.00734`)
3. "The Operadic Nerve, Relative Nerve, and the Grothendieck Construction," with L.Z. Wong,
   Theory and Applications of Categories, (forthcoming).
4. "A Grothendieck Construction for Enriched Categories," with L.Z. Wong,
   Advances in Mathematics 344 (2019), 234–261.
5. "Toward a Galois Theory of the Integers Over the Sphere Spectrum," with J. Morava,
   Journal of Geometry and Physics 131 (2018), 41–51.

6. "A Theorem on Multiplicative Cell Attachments with an Application to Ravenel's $X(n)$ Spectra," *Journal of Homotopy and Related Structures*, (forthcoming).
7. "A User's Guide: Relative Thom Spectra via Operadic Kan Extensions," Enchiridion: Mathematical User's Guides Vol. 3 (2017), 1–15.
8. "Relative Thom Spectra via Operadic Kan Extensions," Algebraic & Geometric Topology 17-2 (2017), 1151–1162.
9. "Topological Hochschild Homology of $X(n)$," (`arXiv:1708:09486`)
10. "Lubin Tate Cohomology and Deformations of n-buds," (available on website)
11. "The Harmonic Bousfield Lattice," (available on website)
12. "A Sheaf of Boehmians," with P. Mikusiński Ann. Pol. Math. 107 (2013), 293–307.

Research Lectures

1. "On the PROB of Singular Braids," Third Conference on Operad Theory and Related Topics, Jilin University, 2020.
2. "Generalized Galois Extensions in Derived Algebra," Mathematics Colloquium, University of Nevada, Reno, 2019.
3. "Generalized Galois Extensions in Derived Algebra," Mathematics Colloquium, University of Vermont, 2019.
4. "Group Actions and Cogroup Coactions in ∞-topoi," Topology Seminar, University of Louisiana at Lafayette, 2019.
5. "Koszul Duality in Higher Topoi," Algebraic K-Theory Seminar, University of Illinois at Chicago, 2019.
6. "Koszul Duality in Higher Topoi," Topology Seminar, University of Nevada, Reno, 2019.
7. "Koszul Duality in Higher Topoi," Oberseminar Topologie, Bergische Universität Wuppertal, 2019.
8. "Koszul Duality in Higher Topoi," Oberseminar Topologie, Ruhr-Universität Bochum, 2019.
9. "Comodule and Coalgebra Structure on Derived Quotients in ∞-categories," Topology Seminar, University of British Columbia, 2018
10. "An Operadic Approach to Noncommutative Geometry," Seattle Noncommutative Algebra Day, University of Washington, 2018
11. "Operads of Singular and Virtual Braids," AMS Spring Western Sectional Meeting – Special Session on Algebraic Topology, Portland 2018
12. "Toward Derived Hopf-Galois Extensions," Joint Mathematics Meetings – Special Session on Noncommutative Algebras and Noncommutative Invariant Theory, San Diego 2018

13. "Some Hopf-Galois Extensions in the Derived Setting," Seattle Noncommutative Algebra Day, University of Washington, 2017
14. "Structured Quotients of Ring Spectra and Obstructions to A_∞ Complex Orientations," The Transatlantic Transchromatic Homotopy Theory Conference, University of Regensburg, 2017
15. "A Third Isomorphism Theorem for Thom Spectra and Hopf-Galois Extensions," Category Theory Seminar, Macquarie University, 2017
16. "Graphical Spaces as a Model for Infinity Properads," Mathematics Seminar, University of Melbourne, 2017
17. "Iterated Quotients of Ring Spectra and Spectral Torsors," 58th Cascade Topology Seminar, University of British Columbia, 2017
18. "An Introduction to Thom Spectra and Hopf-Galois Extensions," Algebra Seminar, Temple University, 2017
19. "Iterated Thom Spectra with Examples," Topology Seminar, University of British Columbia, 2016
20. "Hopf-Galois Extensions of Ring Spectra and the Nilpotence Theorem," Topology Seminar, Ohio State University, 2015
21. "MU Without Manifolds," Topology Seminar, University of Chicago, 2015
22. "Hopf-Galois Extensions of Ring Spectra and the Nilpotence Theorem," Topology Seminar, University of Illinois Urbana-Champaign, 2015
23. "Thom Spectra and Coalgebraic Structure," Young Topologists Meeting, École Polytechnique Fédérale de Lausanne, 2015
24. "Non-Commutative Bialgebras in Spectra and Hopf-Galois Extensions," Topology Seminar, Johns Hopkins University, 2015
25. "Non-Commutative Bialgebras in Spectra and Hopf-Galois Extensions," Graduate Student Topology and Geometry Conference, University of Illinois Urbana-Champaign, 2015
26. "Ravenel's $X(n)$ Spectra as Iterated Hopf-Galois Extensions," Topology Seminar, University of Virginia, 2015
27. "Ravenel's $X(n)$ Spectra as Iterated Hopf-Galois Extensions," Topology Seminar, Ohio State University, 2014
28. "A New Class of Hopf-Galois Extensions in Chromatic Homotopy Theory," Modular Invariants in Topology and Analysis, University of Regensburg, 2014
29. "Descent Cohomology and Twisted Forms in Homotopy Theory," Structured Ring Spectra and Their Invariants, University of Manchester, 2014

Expository Lectures

1. "Symmetry, Topology and the Nobel Prize," lecture for high school students on topological phases of matter, given at the University of Washington's Math Day, 2018
2. "The Nerve, the Bar Construction and Classifying Spaces," several lectures given in J. Zhang's student seminar, University of Washington, 2018

3. "Simplicial Sets and Simplicial Homotopy Theory," several lectures given in J. Zhang's student seminar, University of Washington, 2017
4. "An Introduction to Operads," several lectures given in J. Zhang's student seminar, University of Washington, 2017
5. "An Introduction to Homotopy Theory," Current Topics Seminar, University of Washington, 2017
6. "Stabilization of ∞-categories," West Coast Algebraic Topology Student Seminar, University of Oregon, 2013

Grants

1. NSF Grant, *Recent Developments in Noncommutative Algebra and Related Areas*, with James Zhang (DMS-1764210), $21,920
2. NSF Grant, *2018 Young Topologists Meeting*, (DMS-1818905), $30,000

Awards

1. Nominee, University of Washington Postdoc Mentoring Award, 2018.
2. Phi Beta Kappa, Johns Hopkins University Chapter, 2016.
3. Hernandez Mathematics Award, University of Central Florida, 2010.

Service

- Lead Acting Assistant Professor, University of Washington, 2018–2019
- Co-Organizer, *Young Topologists Meeting*, University of Copenhagen, 2018
- Co-organizer, *Recent Developments in Noncommutative Algebra and Related Areas*, University of Washington, 2018
- Co-organizer and Moderator, *Panel on Mental Health for Graduate Students in Math*, University of Washington, 2018
- Organizer, *AMS Special Session in Homotopy Theory*, University of California, Riverside, 2017
- Co-organizer, *Johns Hopkins Graduate Student Topology Seminar*, 2011–2016
- Referee, Algebraic & Geometric Topology, 2017-present
- Reviewer, Mathematical Reviews, 2017-present

Advising

- Sebastian Gant, Undergraduate Thesis, "Reflective Subcategories of *Top*: Hausdorffization and the Like," 2018

Teaching

- Math 324–Advanced Multivariable Calculus, University of Washington, Fall 2018
- Math 300–Introduction to Mathematical Reasoning, Summer 2018
- Math 441–Topology, University of Washington, Summer 2018
- Math 443–Differential Geometry II, University of Washington, Spring 2018
- Math 442–Differential Geometry I, University of Washington, Winter 2018
- Math 324–Advanced Multivariable Calculus, University of Washington, Fall 2017
- Math 441–Topology, University of Washington, Summer 2017
- Math 301–Elementary Number Theory, University of Washington, Summer 2017
- Math 324–Advanced Multivariable Calculus, University of Washington, Spring 2017
- Math 324–Advanced Multivariable Calculus, University of Washington, Winter 2017
- Math 498–Independent Study in Topology, University of Washington, Winter 2017
- Math 308–Matrix Algebra, University of Washington, Fall 2016
- Math 202–Vector Calculus (Online), Johns Hopkins University, Summer 2015
- Math 109–Calculus II (Online), Johns Hopkins University, Summer 2014
- Math 202–Vector Calculus (Online), Johns Hopkins University, Summer 2013
- Math 109–Calculus II (Online), Johns Hopkins University, Summer 2012

References

- Matthew Ando, UIUC
- Andrew Blumberg, University of Texas at Austin
- David Gepner, Purdue University
- Kathryn Hess, EPFL
- Tyler Lawson, University of Minnesota
- Jack Morava, Johns Hopkins University
- James Morrow, University of Washington (teaching)
- Emily Riehl, Johns Hopkins University
- Marcy Robertson, University of Melbourne
- James Zhang, University of Washington