

# Charles W. Rezk

## *Curriculum Vitae*

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- Education*     **University of Pennsylvania** (Philadelphia, PA)     *1987—1991*  
B.A. in mathematics, May 1991.  
M.A. in mathematics, May 1991.
- Massachusetts Institute of Technology** (Cambridge, MA)     *1991—1996*  
Ph.D. in pure mathematics.  
Date of graduation: May 1996.  
Thesis title: “Spaces of Algebra Structures and Cohomology of Operads.”  
Thesis advisor: Michael J. Hopkins.
- Academic Positions*     **Northwestern University** (Evanston, IL)     *1996—2001*  
Ralph P. Boas Visiting Assistant Professor (9/1996–8/1999).  
Instructor (9/1999–8/2001).
- University of Illinois at Urbana-Champaign** (Urbana, IL)  
Assistant Professor of Mathematics     *2001—2006*  
Associate Professor of Mathematics     *2006—2014*  
Professor of Mathematics     *2014—present*
- Visiting Positions*     **Institute for Advanced Study**, (Princeton, NJ)     *9/1999—3/2000 and 1/2001—3/2001*  
Member
- Massachusetts Institute of Technology** (Cambridge, MA)     *1/2006–5/2006*  
Visiting instructor
- Mathematical Sciences Research Institute** (Berkeley, CA)     *1/2014–5/2014*  
Simons Visiting Professor
- Honors*     **Alfred P. Sloan Doctoral Dissertation Fellowship**     *1995—1996*  
**AMS Centennial Fellowship**     *1999—2000*  
**Fellow of the AMS**     *2014*
- Service*     **Editorial board**, *Compositio Mathematica*     *2015–present*

# Charles W. Rezk

*Publications and Creative Works*<sup>1</sup>

**Doctoral Thesis.** “Spaces of Algebra Structures and Cohomology of Operads.” (MIT, 1996)

## **Publications.**

1. “Notes on the Hopkins-Miller theorem.” In *Homotopy Theory via Algebraic Geometry and Group Representations*, Contemporary Mathematics 220, Amer. Math. Soc., 1998, pp. 313-366.
2. “Brown-Comenetz duality and the Adams spectral sequence,” with Mark Mahowald. In *American Journal of Mathematics* **121** (1999), pp. 1153–1177.
3. “A model for the homotopy theory of homotopy theory.” *Trans. Am. Math. Soc.* **353** (2001), 973–1007.
4. “Simplicial structures on model categories and functors,” with B. Shipley and S. Schwede. *Am. J. of Math.* **123** (2001), 551–575.
5. “Every homotopy theory of simplicial algebras admits a proper model.” *Topology and its Applications*, **119** (2002), 65–94.
6. “A resolution of the  $K(2)$ -local sphere at the prime 3,” with P. Goerss, H.-W. Henn, and M. Mahowald. *Annals of Mathematics*, **162** (2005), 777–822.
7. “The units of a ring spectrum and a logarithmic cohomology operation.” *Journal of the American Mathematical Society*, **19** (2006), 969–1014.
8. “Topological modular forms of level 3,” with M. Mahowald. *Pure and Applied Math. Quarterly*, **5** (2009), 853–872.
9. “A cartesian presentation of weak  $n$ -categories.” *Geometry & Topology*, **14** (2010), 521–571. “Correction to ‘A cartesian presentation of weak  $n$ -categories’.” *Geometry & Topology*, **14** (2010), 2301–2304.
10. “The congruence condition for power operations in Morava  $E$ -theory.” *Homology, Homotopy, and Applications*, **11** (2010), 327–379.
11. “Modular isogeny complexes.” *Algebraic & Geometric Topology*, **12** (2012), 1373–1404.
12. “Reedy categories and the  $\Theta$ -construction,” with J. Bergner. *Mathematische Zeitschrift*, **274** (2013), 499-514.
13. “A streamlined proof of Goodwillie’s  $n$ -excisive approximation.” *Algebraic & Geometric Topology*, **13** (2013), 1049–1051.
14. “Comparison of models for  $(\infty, n)$ -categories, I,” with J. Bergner. *Geometry & Topology*, **17** (2013), 2163–2202.

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<sup>1</sup>All papers and preprints are available from <https://faculty.math.illinois.edu/~rezk>.

15. “An  $\infty$ -categorical approach to  $R$ -line bundles,  $R$ -module Thom spectra, and twisted  $R$ -homology,” with M. Ando, A. Blumberg, D. Gepner, and M. Hopkins. *Journal of Topology* **7** (2014), 869–893.
16. “Units of ring spectra and Thom spectra via structured ring spectra,” with M. Ando, A. Blumberg, D. Gepner, and M. Hopkins. *Journal of Topology* **7** (2014), 1077–1117.
17. “On Hopkins’ Picard groups for the prime 3 and chromatic level 2”, with P. Goerss, H.-W. Henn, and M. Mahowald. *Journal of Topology* **8** (2015), 267–294.
18. “Isogenies, power operations, and homotopy theory.” In *Proceedings of the ICM, Seoul 2014*, vol. 2 (2014), 1125–1146.
19. “Spectral algebra models of unstable  $v_n$ -periodic homotopy theory.” To appear in *Surveys around Ohkawa’s theorem on Bousfield classes*. (arXiv:1703.02186)
20. “Classifying spaces for 1-truncated compact Lie groups.” *Algebraic & Geometric Topology* **18** (2018), 525–546.
21. “Spectral algebra models of unstable  $v_n$ -periodic homotopy theory,” with M. Behrens. 45 pages. In *Bousfield classes and Ohkawa’s theorem*, Springer Proc. Math. Stat., 309, Singapore, 2020.
22. “Looijenga line bundles in complex analytic elliptic cohomology.” *Tunisian Journal of Mathematics* **2** (2019), 1–42.
23. “The Bousfield-Kuhn functor and topological André-Quillen cohomology”, with M. Behrens, *Inventiones Mathematicae*, **220** (2020), 949-1022.
24. “Comparison of models of  $(\infty, n)$ -categories, II”, *Journal of Topology*, **13** (2020), 1554-1581.
25. “Spectral algebra models of unstable  $v_n$ -periodic homotopy theory,” 45 pages. In *Surveys around Ohkawa’s theorem on Bousfield classes*, Springer Proceedings in Mathematics and Statistics 309, Springer, 2020, 275-323.
26. “Spectral algebraic geometry.” To appear as a chapter in *Stable categories and structured ring spectra*, edited by A. Blumberg, T. Gerhardt, M. Hill. MSRI Publications.

### Conference proceedings edited.

1. *Homotopy theory: Tools and applications*, with Daniel G. Davis, Hans-Werner Henn, J.F. Jardine, Mark W. Johnson, eds. *Contemporary Mathematics* **729**, AMS, 2019.

### Works submitted for publication and other preprints.

1. “Rings of power operations for Morava  $E$ -theories are Koszul.” (arXiv:1204.4831)

### Selected invited presentations at conferences.

- May 15, 2007 – Workshop on Stacks in Geometry and Topology, Fields Institute, Toronto – “Morava  $E$ -theory of commutative  $S$ -algebras and the Frobenius congruence”

- Aug 9, 2007 – Abel Symposium, Oslo, Norway – “Colinear approximations to homotopy theory”
- Jun 26, 2008 – Homotopical Group Theory and Topological Algebraic Topology (invited), Bonn, Germany – “The Frobenius congruence for power operations in Morava E-theory”
- Jun 30, 2008 – HOCAT 2008: Homotopy Structures in Geometry and Algebra (invited), CRM, Barcelona, Spain – “Homotopy theory and  $(\infty, 1)$ -categories”
- May 28, 2009 – Topological Field Theories Conference, Northwestern – “Cartesian presentations of weak n-categories”
- June 11, 2012 – Virginia Topology conference, U. of Virginia – “Power operations in elliptic cohomology”
- March 27, 2013 – Equivariant, Chromatic, and Motivic Homotopy Theory, Northwestern University – “Power operations at height 2”
- May 11, 2013 – Midwest Topology Seminar, U. of Kentucky, Lexington – “ $p$ -isogeny modules, and calculations in multiplicative stable homotopy at height 2”
- April 10, 2014 – Reimagining the Foundations of Algebraic Topology, MSRI – “Calculations in multiplicative stable homotopy theory at height 2”
- June 24, 2014 – Manifolds, K-theory, and Related Topics, Dubrovnik, Croatia – “Koszul resolutions of power operation algebras”
- August 18, 2014 – ICM Invited Lecture, Topology Section, Seoul, South Korea – “Isogenies, power operations, and homotopy theory”
- June 1-19, 2015 – Felix Klein lectures, Hausdorff Institutue/Max Planck Institute, Bonn (six 120 minute lectures)
- June 29, 2015 – Advances in Homotopy Theory Conference, Strasbourg, France – “Calculating with power operations for Morava E-theory at height 2”
- October 29, 2016 – AMS Sectional Meeting invited address, Minneapolis, MN – “On some approximations to homotopy theory”
- June 8, 2017 – The Transatlantic Homotopy Theory Conference, Regensburg – “Looijenga line bundles and complex analytic elliptic cohomology”
- April 3, 2019 – Oberwolfach Arbeitsgemeinschaft: Elliptic cohomology according to Lurie — “The eye of the storm: Lubin-Tate spectra”
- June 24-28, 2019 – Summer School on Higher Topos Theory and Univalent Foundations – “Higher topos theory” (five 90 minute lectures)
- October 5, 2019 – Midwest Topology Seminar, U. of Chicago – “On maps of  $E_\infty$  and  $H_\infty$ -ring spectra”
- June 25-26, 2021 – Toposes Online (IHES) – “Higher Topos Theory” (four 60 minute lectures) [zoom]
- February 3, 2022 – Princeton algebraic topology seminar – “Understanding accessible  $\infty$ -categories” [zoom]

## Graduate students supervised.

- Rekha Santhanam (Ph.D. student, 2003–May, 2008). Ph.D. Thesis “Units of Equivariant Ring Spectra”. Was postdoc at JHU. Currently Asst Prof at IIT Bombay.
- Barry Walker (Ph.D. student, 2004–May, 2008). Ph.D. Thesis “Multiplicative Orientations of K-Theory and  $p$ -adic analysis”. Was instructor at Northwestern. Did not get a subsequent academic position; has worked recently as a NetMath mentor.
- Nathaniel Stapleton (Ph.D. student, 2006–May, 2011). Ph.D. Thesis “Transchromatic Generalized Character Maps”. Was postdoc at MIT, then at MPIM Bonn, then at Regensburg. Currently Asst Prof at U Kentucky, Lexington.
- Peter Nelson (Ph.D. student, 2010–2016). Ph.D. Thesis “A small presentation for Morava  $E$ -theory power operations”. Was a postdoc at University of Haifa. I haven’t heard from him in a while.
- Zhen Huan (Ph.D. student, 2010–2017). Ph.D. Thesis “Quasi-elliptic cohomology”. Currently a research associate at Sun Yat-sen University, Guangzhou, China.
- Mychael Sanchez [Smith] (Ph.D. student, 2011–2018). Ph.D. Thesis “Equivariant  $E_\infty$ -algebras”. Currently an Asst Prof at University of New Mexico, Valencia Campus.
- Nima Rasekh (Ph.D. student, 2013–2018). Ph.D. Thesis “A Theory of Elementary Higher Toposes”. Postdoc at EPFL, Lausanne, Switzerland.
- William Balderrama (Ph.D. student, 2016–2021). Ph.D. Thesis “Deformations of Homotopy Theories via Algebraic Theories”. Will start as a postdoc at U. of Virginia.
- Robert Joseph Rennie (passed prelim Spring 2019, 2017–present).
- Abhra Abir Kundu (passed prelim Fall 2020, 2018–present).
- Heyi Zhu (passed prelim Summer 2021, 2018–present).