Allen Yuan

Contact Information

Address: Department of Mathematics, Columbia University, New York, NY 10027
Email: yuan@math.columbia.edu
Webpage: allenyuan.me

Research

Algebraic topology, higher category theory, and interactions with algebraic K-theory, number theory, and algebraic geometry.

Education & Employment

NSF Postdoctoral Fellow 2020 - Present
Columbia University, New York NY

Visitor 2020 - 2021
Institute for Advanced Study, Princeton, NJ

Ph.D. Mathematics 2015 - 2020
Massachusetts Institute of Technology, Cambridge, MA
Dissertation: *The Frobenius in higher algebra*, advised by Jacob Lurie.

A.B. in Mathematics, secondary in Computer Science 2011 - 2015
Harvard University, Cambridge, MA

Grants Fellowships & Awards

- NSF Mathematical Sciences Postdoctoral Research Fellowship 2020 - 2023
- NSF Graduate Research Fellowship 2015 - 2020
- Barry M. Goldwater Scholarship 2014 - 2015
- William Lowell Putnam Competition, 1st Place Team 2012
- International Mathematics Olympiad, Silver Medal 2010
- USA Mathematics Olympiad, 1st Place 2010

Papers

14. *The sphere of semiadditive height* 1, submitted, 2022.
13. *The Chromatic Nullstellensatz* (with R. Burklund and T. Schlank), submitted, 2022.
12. *Examples of chromatic redshift in algebraic K-theory*, submitted, 2021.
11. *Chromatic convergence for the algebraic K-theory of the sphere spectrum* (with A. Blumberg and M. Mandell), submitted, 2021.
10. *Higher semiadditive Grothendieck-Witt theory and the $K(1)$-local sphere* (with S. Carmeli), submitted, 2021.
9. *A version of Waldhausen's chromatic convergence for TC* (with A. Blumberg and M. Mandell), to appear in Bulletin of the London Mathematical Society, 2021.
8. *Wilson Spaces, Snaith Constructions, and Elliptic Orientations* (with H. Chatham and J. Hahn), submitted, 2019.
7. *Integral Models for Spaces via the Higher Frobenius*, Journal of the American Mathematical Society **36** (2023).
6. *Exotic Multiplications on Periodic Complex Bordism* (with J. Hahn). Journal of Topology **13** (2020).

5. *Multiplicative Structure in the Stable Splitting of* $\Omega SL_n(\mathbb{C})$, (with J. Hahn), Advances in Mathematics **348** (2019).

Pre-graduate school:

4. *Irreducible Canonical Representations in Positive Characteristic* (with B. Gunby and A. Smith), Research in Number Theory **1(1)** (2015).
3. *Proof of a Conjecture of Guy on Class Numbers* (with L. Chua, B. Gunby, and S. Park), International Journal of Number Theory, **11(4)** (2015).
2. *Linearly Many Faults in Arrangement Graphs* (with E. Cheng and L. Liptak), Networks, **61(4)** (2013).
1. *Linearly Many Faults in* (n, k)*-Star Graphs* (with E. Cheng and L. Liptak), International Journal for the Foundations of Computer Science, **22(7)** (2011).

Invited Talks

28. Generalised Lie algebras in Derived Geometry — TBD
    Utrecht, Netherlands
27. MIT Topology Seminar — Dec 2022
26. UChicago Topology Seminar — Nov 2022
25. Northwestern Topology Seminar — Nov 2022
24. AMS Western Sectional Meeting — Oct 2022
    The chromatic Nullstellensatz
23. UPenn geometry and topology seminar — Apr 2022
    The geometric points of a cohomology theory
22. Electronic Computational Homotopy Theory Seminar — Apr 2022
    The chromatic Nullstellensatz
21. UCSD Topology Seminar — Mar 2022
    The chromatic Nullstellensatz
20. Chicagoland Topology Seminar — Feb 2022
    The chromatic Nullstellensatz
19. Utrecht Chromatic Homotopy Theory seminar — Jan 2022
    Ambidexterity Phenomena at height 1
18. Munster Topology Seminar — Dec 2021
    Examples of chromatic redshift in algebraic K*-theory*
17. Jerusalem Topology seminar — May 2021
    Examples of chromatic redshift in algebraic K*-theory*
16. Electronic Algebraic K-theory Seminar — April 2021
    Examples of chromatic redshift in algebraic K*-theory*
15. Bonn Topology Seminar — Dec 2020
    Ambidexterity Phenomena at height 1
14. EPFL Topology Seminar — Sep 2020
    Integral models for spaces via the higher Frobenius
13. Oberseminar: Integral Homotopy Theory (after Allen Yuan) — Jul 2020
    University of Regensburg
    $\mathbb{E}_\infty$*-coalgebras and a generalized Segal conjecture*

12. CUNY Geometry and Topology Seminar — Jun 2020
Integral models for spaces via the higher Frobenius

11. Johns Hopkins Topology Seminar — Feb 2020
A generalized Segal Conjecture

10. Copenhagen Topology Seminar — Dec 2019
A generalized Segal Conjecture

9. Oberwolfach Seminar: Topological Cyclic Homology and Arithmetic — Oct 2019
Integral models for spaces via the higher Frobenius

8. UVA Topology Seminar — Oct 2019
Integral models for spaces via the higher Frobenius

7. AMS Sectional Meeting: Homotopy theory and Algebraic K-theory — Oct 2019
Binghamton University
Integral models for spaces via the higher Frobenius

6. UCLA Algebraic Topology Seminar — Feb 2019
The Frobenius in higher algebra

5. USC Geometry and Topology seminar — Feb 2019
The Frobenius in higher algebra

4. UIC Topology Seminar — Oct 2018
The Frobenius in higher algebra

3. UChicago Topology Seminar — Oct 2018
The Frobenius in higher algebra

2. Northwestern Topology Seminar — Oct 2018
The Frobenius in higher algebra

1. BIRS-CMO: ∞-categories, ∞-operads, and applications — May 2018
Oaxaca, Mexico
The Frobenius for coalgebras

Teaching

Columbia University
Instructor for Math UN2010: Linear Algebra — Spring 2022

Massachusetts Institute of Technology
Teaching Assistant for 18.03: Differential Equations — Spring 2018

MIT MathROOTS
Academic mentor — Summer 2019
Academic mentor — Summer 2018

MIT Directed Reading Program
Mentor for Alexander Clifton and Miguel Young — Winter 2015 - 2016

Harvard University
Course Assistant for Math 123: Rings and Fields — Spring 2014

IDEA Math
Instructor — 2011 - 2013

Professional Activities & Service

Columbia Algebraic Topology Seminar
Co-organizer — Spring 2022 - present

MIT Juvitop
Organizer — Fall 2016

MIT Topology seminar
Organizer — Spring 2016

Referee for: Adv. Math., Isr. J. Math

Expert opinions for: IMRN, J. Top., Compositio