Sanath Devalapurkar

CONTACT INFO

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EDUCATION

Harvard University, Cambridge, MA
Ph.D. in Mathematics, started in September 2020

Massachusetts Institute of Technology, Cambridge, MA
B.S. in Mathematics, Minor in Physics, May 2020
Coursework available at `https://sanathdevalapurkar.github.io/courses.html`
Overall GPA: 4.9/5.0; math GPA: 5.0/5.0

INSTITUTIONS
VISITED

Northwestern University, Evanston, IL
March - April 2022

PUBLICATIONS AND
PREPRINTS

Roots of unity in $K(n)$-local rings. **Proc. Amer. Math. Soc**, Volume 148 (2020),
3187-3194. Available at `https://doi.org/10.1090/proc/14960`.

On the James and Hilton–Milnor splittings, and the metastable EHP sequence (2019).
Joint with Peter Haine. **Doc. Math.** 26, 1423-1464 (2021). Available at `https://www.elibm.org/article/10012158`.

Loop groups and intertwinings of positive-energy representations (2021). Chapter 22
of `https://arxiv.org/abs/2109.12250`.

Higher chromatic Thom spectra via unstable homotopy theory (2020). Available at
`https://arxiv.org/abs/2004.08951`.

Hodge theory for elliptic curves and the Hopf element ν (2019). Available at `https://arxiv.org/abs/1912.02548`.

The Ando-Hopkins-Rezk orientation is surjective (2019). Available at `https://arxiv.org/abs/1911.10534`.

*The Dieudonné modules and Ekedahl-Oort types of Jacobians of hyperelliptic curves in
odd characteristic* (2017). Joint with John Halliday. Available at `https://arxiv.org/abs/1712.04921`.

The Lubin-Tate stack and Gross-Hopkins duality (2017). Available at `https://arxiv.org/abs/1711.04806`.

SELECTED AWARDS

2022 — NSF Graduate Research Fellowship.
2021 — Fellowship for Students from India, Harvard University.
2020 — Phi Beta Kappa.
2020 — Paul and Daisy Soros Fellow.
2020 — James Mills Peirce Fellowship, Harvard University.
2016 — Finalist at the Intel Science Talent Search; awarded the Seaborg Award and
Student Initiative and Research Report badges.
2015 — First place overall at the European Union Contest for Young Scientists in Italy.

2015 — First place in mathematics at the Intel International Science and Engineering Fair.

<table>
<tr><td>INVITED TALKS</td><td>Chromatic aberrations of the geometric Satake equivalence (March 2022), at the topology seminar at Northwestern University.</td></tr>
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Chromatic aberrations of the geometric Satake equivalence (March 2022), at the topology seminar at Northwestern University.

Chromatic Thom spectra and unstable homotopy theory (March 2021), at the topology seminar at the University of Rochester.

Splitting cobordism spectra (August 2020), at the Moscow-Beijing topology seminar at Tsinghua University.

SEMINAR TALKS

Given in graduate school

Mirror symmetry for toric varieties and combinatorics (March 2022), at Trivial Notions at Harvard.

Examples and statement of the quantum Noether theorem (December 2021), two talks for Juvitop on Costello-Gwilliam.

Nonabelian Fourier transform/bi-Whittaker reduction (October 2021), for a seminar on the universal regular centralizer group scheme.

Braided monoidal categories and quantum groups (October 2021), for a seminar on quantum groups.

Ten talks on various topics related to deformation quantization (Summer 2021), for a seminar that I organized; website at `https://sanathdevalapurkar.github.io/quantization.html`.

Poincaré duality in Morava K-theory (April 2021), at a reading seminar on Abouzaid-Blumberg at Harvard-MIT.

Yang-Mills and Hitchin (April 2021), at Beilinson-Drinfeld reading seminar at Harvard.

Families of abelian varieties and stable homology (April 2021), at Juvitop on Feng-Galatius-Venkatesh's "The Galois Action on Symplectic K-Theory".

Periods (April 2021), at Trivial Notions at Harvard.

Perfect prisms and perfectoid rings (April 2021), at the number theory STAGE seminar at MIT on prismatic cohomology.

The p-curvature conjecture (March 2021), at Beilinson-Drinfeld reading seminar at Harvard.

Nilpotent singular support and the Hecke action I and II (March 2021), two talks at a seminar on shtukas at Harvard.

Overview of Beilinson-Drinfeld (November 2020), at Beilinson-Drinfeld reading seminar at Harvard.

Globalization I (November 2020), at the Thursday seminar at Harvard on condensed math.

Hodge theory in positive characteristic (October 2020), at Trivial Notions at Harvard.

Étale fundamental groups (October 2020), at the number theory STAGE seminar at MIT on the Weil conjectures.

Given as an undergraduate

The nonabelian Hodge correspondence (March 2020), for CORONAGS (Corona Outbreak-Response Omnipresent (Noncommutative) Algebraic Geometry Seminar).

The Riemann-Hilbert correspondence, parts I and II (March 2020), two talks for the Mixed Hodge Modules seminar at Harvard.

Representations of Frobenius kernels (March 2020), for the Langlands support group (on modular representation theory) at Harvard.

Loop groups and their representations (December 2019), for Juvitop at MIT.

Hodge theory and topological modular forms (November 2019), for Modular Forms, Arithmetic, and Women in Mathematics at Emory University.

Invariants of manifolds (September 2019), for the MIT Undergraduate Mathematics Association.

The Witten genus and topological modular forms (August 2019), final presentation for the UChicago REU.

Stable splittings of classifying spaces of compact Lie groups (November 2018), for the Thursday seminar at Harvard.

The Morava K-theory of Eilenberg–MacLane spaces I and II (October 2018), two talks for Juvitop at MIT.

$\mathbf{E}_\infty$*-ring structures on Johnson-Wilson theory* (August 2018), final presentation for the MIT SPUR program.

Orientations of derived formal groups (April 2018), for Juvitop at MIT.

An overview of p-adic Hodge theory (February 2018), for a reading seminar on p-adic Hodge theory and THH.

Roots of unity in $K(n)$-local $\mathbf{E}_\infty$-rings (January 2018), at a session on algebraic topology at the Joint Math Meetings in San Diego, California.

Ran a month-long course on chromatic homotopy theory (January 2018). Notes at `sanathdevalapurkar.github.io/files/iap-2018.pdf`.

The Tate-valued Frobenius (December 2017), for a reading seminar on p-adic Hodge theory and THH.

A global perspective on stable homotopy theory (December 2017), for the Kan Seminar at MIT.

The Hitchhiker's Guide to Chromatic Homotopy Theory (November 2017), for a seminar at Harvard on spectral sequences.

Equivariant homotopy theory (November 2017), for a reading seminar on p-adic Hodge theory and THH.

Spectra, $\mathbf{E}_\infty$-rings (October 2017), for a reading seminar on p-adic Hodge theory and THH.

MU, BP, and everything (October 2017), for a seminar at Harvard on spectral sequences.

Examples of Goodwillie towers (October 2017), for Juvitop at MIT.

Milnor's exotic spheres (September 2017), for the Kan Seminar at MIT.

163 and all that (September 2017), at MIT's Student Colloquium for Undergraduates in Mathematics.

Homotopy theory and connections with arithmetic geometry (July 2017), three lectures at Emory University.

TEACHING

Mentor for high school research projects via PRIMES-USA:
- Conjugation on the dual Steenrod algebra (Jan - Nov 2018).
- Variants of de Rham complexes (Jan - Nov 2022).

Teaching Fellow (duties include grading and holding office hours) at Harvard for:
- Math 223a (Algebraic number theory) at Harvard (Fall 2021).
- Math 231br (Algebraic topology II) at Harvard (Spring 2022).

Helped run the qualifying exam tutorial at Harvard (Fall 2021).

Mentor for Harvard's Directed Reading Program in math, on the following topics:
- cobordism hypothesis and topological quantum field theories (Spring 2022).
- topological K-theory (Fall 2021).
- function fields and elliptic curves (Spring 2021).
- surfaces and Chern classes in differential geometry (Fall 2020).

Organized reading seminars at Harvard on:
- Thursday seminar on unstable homotopy theory and exponent theorems (Spring 2022). Website at `https://sanathdevalapurkar.github.io/thursday-spring-2022.html`.
- Quantum groups (Fall 2021).
- Deformation quantization (Summer 2021). Website at `https://sanathdevalapurkar.github.io/quantization.html`.
- Quantization of Hitchin's integrable system/Beilinson-Drinfeld (Fall 2020 - Spring 2021).

Grader at MIT (as an undergraduate) for:
- 6.875/18.425 (graduate cryptography and cryptanalysis), September – December 2019.
- 18.A34 (Putnam seminar), September 2017 – December 2017.

SERVICE AND MISCELLANY

Volunteer at Harvard's National Collegiate Research Conference 2022.

Moderator for Vakil's Foundations Of Algebraic Geometry online "course" (April 2020 – present).

Reviewer of a textbook on algebraic topology for the MIT press.

Reviewer of project proposal for the Banff Research institute.

Associate advisor for freshmen, August 2019 – Spring 2020.

The importance of theoretical research (2018). Published in *The Tech*; available at `https://thetech.com/2018/11/01/importance-theoretical-research`.

Vice president of MIT's Undergraduate Math Association (2018–2020).

Organizer for MIT's Student Colloquium for Undergraduates in Mathematics, 2017 – present.

Active on MathOverflow since 2017; user profile at `https://mathoverflow.net/users/102390/skd`. Also active on MathOverflow's homotopy theory chat.

Physical Mathematics of Quantum Field Theory, UMass Amherst, MA (August 2022).

Quantized symplectic singularities and applications to Lie theory, MIT, MA (June 2022).

Homotopical Methods in Geometry and Physics, Northwestern University, Evanston, IL (March 2022).

Arizona Winter School (Automorphic Forms Beyond GL_2), Tucson, AZ (March 2022). Part of problem session group on Geometric aspects of automorphic forms.

MSRI, Introductory Workshop + Connections for Women: Higher Categories and Categorification, Berkeley, CA (February 2020).

Modular Forms, Arithmetic, and Women in Mathematics, Emory University, Atlanta, GA (November 2019).

Chromatic Homotopy Theory — Journey to the Frontier, Boulder, CO (May 2018).

Homotopy theory: tools and applications, UIUC (July 2017).

Talbot workshop on obstruction theory for structured ring spectra, Gooding, ID (May 2017).