

# Sanath Devalapurkar

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| <b>Employment</b>               | <b>Johns Hopkins University</b> , Baltimore, MD<br><i>January 2027 onwards</i><br>Tenure-track Assistant Professor<br><br><b>Institute for Advanced Study</b> , Princeton, NJ<br><i>August 2026 - December 2026</i><br>Member in the School of Mathematics<br><br><b>University of Chicago</b> , Chicago, IL<br><i>September 2025 - August 2026</i><br>L.E. Dickson Instructor and NSF Postdoc<br><br><b>Inpher</b> , Lausanne, Switzerland<br><i>May - August 2022</i><br>Worked on differential privacy   |   |
| <b>Education</b>                | <b>Harvard University</b> , Cambridge, MA<br>Ph.D. in Mathematics, May 2025<br><i>Thesis</i> : Spherochromatism in representation theory and arithmetic geometry<br><i>Advisors</i> : Mike Hopkins and Dennis Gaitsgory<br><br><b>Massachusetts Institute of Technology</b> , Cambridge, MA<br>B.S. in Mathematics, Minor in Physics, May 2020<br>Overall GPA: 4.9/5.0; math GPA: 5.0/5.0   |   |
| <b>Publications / submitted</b> | <ol style="list-style-type: none"><li>ku-theoretic spectral decompositions for spheres and projective spaces. (2023).</li><li>Chromatic aberrations of geometric Satake over the regular locus (2023).</li><li><math>p</math>-typical curves on <math>p</math>-adic Tate twists and de Rham-Witt forms (2023). Joint with S. Mondal.</li><li>Loop groups and intertwinings of positive-energy representations (2025). Chapter 22 of a book edited by A. Amabel, A. Debray, and P. J. Haine. <i>Cambridge Studies in Advanced Mathematics</i>.</li><li>A Long Exact Sequence in Symmetry Breaking: order parameter constraints, defect anomaly-matching, and higher Berry phase (2023). Joint with A. Debray, C. Krulewski, Y. L. Liu, N. Pacheco-Tallaj, and R. Thorngren.</li><li>Lifting to truncated Brown-Peterson spectra and Hodge-de Rham degeneration in characteristic <math>p &gt; 0</math> (2023). <i>Forum of Math, Sigma</i>.</li><li>Topological Hochschild homology, truncated Brown-Peterson spectra, and a topological Sen operator (2023).</li><li>Examples of disk algebras (2023). Joint with J. Hahn, T. Lawson, A. Senger, and D. Wilson.</li></ol> |   |

9. Higher chromatic Thom spectra via unstable homotopy theory (2024). *Algebr. Geom. Topol.* **24**, no.1, 49-108.
10. Hodge theory for elliptic curves and the Hopf element  $\nu$  (2023). *Bull. Lond. Math. Soc.* **55**, no.2, 826-842.
11. On the James and Hilton–Milnor splittings, and the metastable EHP sequence (2021). Joint with P. Haine. *Doc. Math.* **26**, 1423-1464.
12. Roots of unity in  $K(n)$ -local rings (2020). *Proc. Amer. Math. Soc.* **148** (2020), 3187-3194.

**Preprints  
(available on  
personal website)**

13.  $\mathrm{THH}(\mathbf{Z}_p)$  and the image of  $J$  (2025). Joint with A. Raksit.
14. Derived geometric Satake for  $\mathrm{PGL}_2^{\times 3}/\mathrm{PGL}_2^{\mathrm{diag}}$  (2023).
15. Generalized  $n$ -series and de Rham complexes (2023). Joint with M. Misterka.
16. The Ando-Hopkins-Rezk orientation is surjective (2019).
17. The Dieudonné modules and Ekedahl-Oort types of Jacobians of curves in odd characteristic (2017). Joint with J. Halliday.
18. The Lubin-Tate stack and Gross-Hopkins duality (2017).

**Selected awards**

NSF Postdoctoral Fellowship, 2025 - 2027  
 Honorable mention, Jane Street Graduate Research Fellowship, 2023  
 NSF Graduate Research Fellowship, 2022 - 2025  
 Fellowship for Students from India, Harvard University, 2021  
 Phi Beta Kappa, 2020  
 Paul and Daisy Soros Fellow, 2020 - 2022  
 James Mills Peirce Fellowship, Harvard University, 2020  
 Finalist at the Intel Science Talent Search; awarded the Seaborg Award and Student Initiative and Research Report badges, 2016  
 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, 2015

**Talks (invited or  
about my work)**

- *Calculus and cohomology (or, nonlinear numbers)* (July 2025), at the Connections Between Algebraic Geometry and Algebraic Topology session at the 2025 Summer Research Institute in Algebraic Geometry in Colorado.
- *Geometric Langlands duality with generalized coefficients* (June 2025), at the Beyond the Telescope Conjecture conference at the Isaac Newton Institute.
- *Spherochromatism in geometric representation theory* (June 2025), at the Modern Developments in Geometry and Higher Structures conference at the University of Maryland.
- *Ruminations about Langlands duality with generalized coefficients* (June 2025), at a conference on representation theory and the Langlands program at Northeastern.
- *A special function from chromatic homotopy theory* (May 2025), at the Babytop seminar at Harvard.
- *Some aspects of geometric Langlands duality with generalized coefficients* (May 2025), at the Lie groups seminar at MIT.
- *Spherochromatism in representation theory and arithmetic geometry* (April 2025), my thesis defense at Harvard University.

- *Some applications of homotopy theory to arithmetic geometry* (April 2025), at the arithmetic geometry seminar at the IAS/Princeton University.
- *Spherochromatism in geometric representation theory* (April 2025), at the representation theory seminar in the University of Texas, Austin.
- *The image of  $J$  and  $p$ -adic geometry* (March 2025), at an AMS special session on algebraic K-theory at the University of Kansas.
- *In and around derived geometric Satake* (March 2025), series of two talks at a special seminar in the University of Chicago.
- *On some relationships between homotopy theory and geometric representation theory* (February 2025), at the Chicago Chromatic Homotopy Day.
- *Hodge theory in characteristic  $p$  and homotopy theory* (January 2025), at the University of British Columbia.
- *The image of  $J$  and  $p$ -adic geometry* (January 2025), at the AMS special session on homotopy theory at the Joint Mathematical Meetings in Seattle.
- *Hodge theory in characteristic  $p$  and homotopy theory* (November 2024), at Johns Hopkins University.
- *Trichotomies in algebraic topology and representation theory* (October 2024), at the University of Southern California.
- *Generalizations of Hamiltonian varieties in relative geometric Langlands* (October 2024), at the symplectic geometry seminar at Stanford.
- *Trichotomies in homotopy theory and geometric Langlands duality* (October 2024), at the geometry and representation theory seminar at UC Berkeley.
- *The image of  $J$  and  $p$ -adic geometry* (October 2024), at the number theory seminar at Harvard.
- *Generalizations of Hamiltonian varieties in relative geometric Langlands* (May 2024), at the number theory and representation theory seminar at the University of Maryland.
- *Gauss composition and geometric Satake* (March 2024), at the arithmetic statistics seminar at Harvard.
- *The arithmetic/geometry of quadratic forms, and elliptic curves* (Feb 2024), a talk at Harvard/MIT for high school students.
- *Equivariant homotopy theory and geometric Langlands duality* (Jan 2024), at the algebraic topology seminar at the University of Chicago.
- *Equivariant homotopy and Langlands duality* (Jan 2024), at the algebraic topology seminar at UCLA.
- *Relative Langlands and (chromatic) homotopy theory* (Oct 2023), at the Geometry, Symmetry and Physics seminar at Yale.
- *Equivariant homotopy theory and geometric Langlands* (Oct 2023), at the Algebraic Topology seminar at Princeton.
- *Chromatic aberrations of the geometric Satake equivalence*, (Apr 2023), at the mathematical physics seminar at the Perimeter Institute for Theoretical Physics.
- *Generalized equivariant cohomology and Langlands duality*, (Nov 2022 and Feb 2023), series of three lectures at Johns Hopkins University.
- *A topological Sen operator* (Feb 2023), at the topology seminar at the University of Chicago.
- *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.

## Teaching

**Teaching fellow** (primary instructor) for one section of:

- **Math 99 (Integrable Systems)** at Harvard (Spring 2024).
- **Math 1B (Integration, Series and Differential Equations)** at Harvard (Fall 2022).

**Course Assistant** (duties include grading and holding office hours) for:

- **Math 223a (Algebraic number theory)** at Harvard, taught by Mark Shusterman (Fall 2021).
- **Math 231br (Algebraic topology II)** at Harvard, taught by Mike Hopkins (Spring 2022).

High school research **mentor for PRIMES-USA**:

- Variants of de Rham complexes (Jan - Dec 2022). My student won fourth place in the Regeneron Science Talent Search 2023.
- Conjugation on the dual Steenrod algebra (Jan - Nov 2018).

Helped run the qualifying exam tutorial at Harvard (Fall 2021, Fall 2022): answered students' questions and gave mini-lectures on a variety of topics.

Mentor for Harvard's Directed Reading Program in math, on the following topics:

- $p$ -adic cohomology theories (Fall 2023).
- advanced algebraic topology (Fall 2022).
- 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).

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.

## Organization

Organized seminars at Harvard on:

- **Relative Langlands**, following Ben-Zvi–Sakellaridis–Venkatesh (Fall 2023). Organized jointly with Ben Gammage.
- **Thursday seminar on unstable homotopy theory and exponent theorems** (Spring 2022). Organized jointly with Mike Hopkins.
- **Quantum groups** (Fall 2021).
- **Deformation quantization** (Summer 2021).
- **Quantization of Hitchin's integrable system**/Beilinson-Drinfeld (Fall 2020 - Spring 2021).

**Service and  
miscellany**

- Volunteer (on Saturdays) at the Cambridge Math Circle (for children between 1st - 8th grade), 2023 – present.
- Referee/quick opinion for *Bulletin LMS*, *Inventiones*, *Selecta*.
- Volunteer Judge at Harvard's National Collegiate Research Conference, 2022 and 2023.
- 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 a 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>.