

# Sanath Devalapurkar

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## CONTACT INFORMATION

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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

## PUBLICATIONS AND PREPRINTS

### Publications

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

### Preprints

*Quantization, cyclotomic structures, and applications* (2021). In preparation.

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

*On the James and Hilton–Milnor splittings, and the metastable EHP sequence* (2019). Joint with Peter Haine. Available at <https://arxiv.org/abs/1912.04130>. Submitted.

*Hodge theory for elliptic curves and the Hopf element  $\nu$*  (2019). Available at <https://arxiv.org/abs/1912.02548>. Submitted.

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

*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>.

## BOOKS/LONG DOCUMENTS

*Algebraic topology I* (2018). Notes from course taught by Haynes Miller. At online with the AMS, and MIT OpenCourseWare.

*Algebraic topology II* (2018). Notes from course taught by Haynes Miller. Available from <https://sanathdevalapurkar.github.io/files/main2.pdf>. Refined into a book by Haynes Miller: <http://math.mit.edu/~hrm/papers/lectures-905-906.pdf>.

*Talbot Proceedings on obstruction theory for structured ring spectra* (2017). Joint with Eva Belmont et. al. Available from the Talbot workshop’s webpage at <http://math.mit.edu/conferences/talbot/2017/talbot-notes-2017.pdf>.

## SELECTED AWARDS

2021 — Fellowship for Students from India, Harvard University.  
2020 — Phi Beta Kappa.  
2020 — PD 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.

INVITED TALKS	<p><i>Chromatic Thom spectra and unstable homotopy theory</i> (March 2021), at the topology seminar at the University of Rochester.</p> <p><i>Splitting cobordism spectra</i> (August 2020), at the Moscow-Beijing topology seminar at Tsinghua University.</p>
SEMINAR TALKS	<p><i>Yang-Mills and Hitchin</i> (March 2021), at Beilinson-Drinfeld reading seminar at Harvard.</p> <p><i>Chiral algebras</i> (April 2021), at Beilinson-Drinfeld reading seminar at Harvard.</p> <p><i>Families of abelian varieties and stable homology</i> (April 2021), at Juvitop on Feng-Galatius-Venkatesh's "The Galois Action on Symplectic K-Theory".</p> <p><i>Periods</i> (April 2021), at Trivial Notions at Harvard.</p> <p><i>Perfect prisms and perfectoid rings</i> (April 2021), at the number theory STAGE seminar at MIT on prismatic cohomology.</p> <p><i>The p-curvature conjecture</i> (March 2021), at Beilinson-Drinfeld reading seminar at Harvard.</p> <p><i>Nilpotent singular support and the Hecke action I and II</i> (March 2021), two talks at a seminar on shtukas at Harvard.</p> <p><i>Overview of Beilinson-Drinfeld</i> (November 2020), at Beilinson-Drinfeld reading seminar at Harvard.</p> <p><i>Globalization I</i> (November 2020), at the Thursday seminar at Harvard on condensed math.</p> <p><i>Hodge theory in positive characteristic</i> (October 2020), at Trivial Notions at Harvard.</p> <p><i>Étale fundamental groups</i> (October 2020), at the number theory STAGE seminar at MIT on the Weil conjectures.</p> <p><i>The nonabelian Hodge correspondence</i> (March 2020), for CORONAGS (Corona Outbreak-Response Omnipresent (Noncommutative) Algebraic Geometry Seminar).</p> <p><i>The Riemann-Hilbert correspondence, parts I and II</i> (March 2020), two talks for the Mixed Hodge Modules seminar at Harvard.</p> <p><i>Representations of Frobenius kernels</i> (March 2020), for the Langlands support group (on modular representation theory) at Harvard.</p> <p><i>Loop groups and their representations</i> (December 2019), for Juvitop at MIT.</p> <p><i>Hodge theory and topological modular forms</i> (November 2019), for Modular Forms, Arithmetic, and Women in Mathematics at Emory University.</p> <p><i>Invariants of manifolds</i> (September 2019), for the MIT Undergraduate Mathematics Association.</p> <p><i>The Witten genus and topological modular forms</i> (August 2019), final presentation for the UChicago REU.</p> <p><i>Stable splittings of classifying spaces of compact Lie groups</i> (November 2018), for the Thursday seminar at Harvard.</p> <p><i>The Morava K-theory of Eilenberg-MacLane spaces I and II</i> (October 2018), two talks for Juvitop at MIT.</p> <p><i><math>E_\infty</math>-ring structures on Johnson-Wilson theory</i> (August 2018), final presentation for the MIT SPUR program.</p> <p><i>Orientations of derived formal groups</i> (April 2018), for Juvitop at MIT.</p>

*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](https://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.

## EXPERIENCE

*University of Chicago REU* Summer 2019  
Worked with Professors Mark Behrens and Peter May on unstable homotopy theory and its connections with chromatic homotopy theory, and applications of topological modular forms to differential topology and its connections with Hodge theory.

*Undergraduate Research at MIT with Andrew Sutherland* Spring 2019  
Worked with Professor Andrew Sutherland on computing gonality of modular curves to make Merel's bound effective.

*SPUR at MIT math department* Summer 2018  
Worked with Robert Burklund on constructing an  $\mathbf{E}_\infty$ -ring structure on height 2 Johnson–Wilson theory.

*Undergraduate Research at MIT with Goncalo Tabuada* Spring 2018  
Worked with Professor Goncalo Tabuada on a project involving topological Hochschild homology.

*Emory University REU* Summer 2017  
Worked with Professor David Zureick-Brown on a joint project with John Halliday to explicitly calculate mod  $p$  Dieudonné modules of hyperelliptic curves.

## SERVICE AND MISCELLANY

Organized a reading seminar on Beilinson-Drinfeld at Harvard (Fall 2020 - Spring 2021).

Mentor for Harvard's Directed Reading Program in math, on the following topics: surfaces and Chern classes in differential geometry (Fall 2020); function fields and elliptic curves (Spring 2021).

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

Grader for 6.875/18.425 (graduate cryptography and cryptanalysis), September – December 2019.

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.

Mentor for a high school research project (on the conjugation action on the mod 2 dual Steenrod algebra) via PRIMES-USA, January – November 2018.

*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).

Grader for 18.A34 (Putnam seminar), September 2017 – December 2017.

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.