

Curriculum Vitæ — Peter Haine

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Citizenship *United States*

Employment

2023–2025 **NSF Postdoctoral Fellow, UC Berkeley**
Sponsoring scientist: David Nadler

2022–2023 **Member, Institute for Advanced Study**
Sponsoring scientist: Jacob Lurie

2021–2022 **NSF Postdoctoral Fellow and UC President’s Postdoctoral Fellow, UC Berkeley**
Sponsoring scientist: David Nadler

Education

2021 **Massachusetts Institute of Technology, Cambridge, MA, *Ph.D. Mathematics***
Advisor: Clark Barwick

2016 **Massachusetts Institute of Technology, Cambridge, MA, *S.B. Mathematics***

Research Interests

Homotopy theory, algebraic geometry, microlocal sheaf theory, & related subjects

Short-term Visits

July 2024 **Institut de Recherche Mathématiques Avancées, Strasbourg, France**

June 2024 **Copenhagen Centre for Geometry and Topology, Copenhagen, Denmark**

June 2023 **Max-Planck-Institut für Mathematik, Bonn, Germany**

June–July 2022 **Universität Regensburg, Regensburg, Germany**

June 2022 **Higher Categories and Categorification, Part 2, MSRI/Unidad Cuernavaca del Instituto de Matemáticas UNAM, Cuernavaca, México**

Spring 2020 **Higher Categories and Categorification, MSRI, Berkeley, CA**

Selected Awards & Distinctions

2021–2025	National Science Foundation Mathematical Sciences Postdoctoral Research Fellowship NSF Award DMS-2102957
2021–2022	President’s Postdoctoral Fellowship, University of California
2021	Mathematics Community Building Award, MIT
2020–2021	George Lusztig PRIMES Mentorship, MIT
Fall 2019	AMS Graduate Student Travel Grant
August 2019	Leibniz Graduate Student Grant, Mathematisches Forschungsinstitut Oberwolfach Workshop on <i>Homotopy Theory</i>
2016–2021	National Science Foundation Graduate Research Fellowship
2016–2019	Dean of Science Fellow, MIT

Publications & Preprints

14. M. Carlson, P. J. Haine, and S. Wolf, *Reconstruction of schemes from their étale topoi*, Jul. 2024, arXiv:2407.19920.
13. P. J. Haine, M. Porta, and J.-B. Teyssier, *Exodromy beyond conicality*, Jan. 2024, arXiv:2401.12825.
12. P. J. Haine and P. Pstrągowski, *Spectral weight filtrations*, Sep. 2023, arXiv:2309.15072.
11. P. J. Haine, T. Holzschuh, and S. Wolf, *Nonabelian basechange theorems & étale homotopy theory*, Apr. 2023, To appear in *Journal of Topology*. arXiv:2304.00938.
10. P. J. Haine, *Profinite completions of products*, May 2024, arXiv:2406.00136.
9. P. J. Haine, T. Holzschuh, and S. Wolf, *The fundamental fiber sequence in étale homotopy theory*, Int. Math. Res. Not., no. 1, pp. 175–196, 2024. DOI: 10.1093/imrn/rnad018, arXiv:2209.03476.
8. A. Amabel, A. Debray, and P. J. Haine, Eds., *Differential cohomology: Categories, characteristic classes, and connections*, Jan. 2023, arXiv:2109.12250. To be published in *Cambridge Studies in Advanced Mathematics*.
7. P. J. Haine, *From nonabelian basechange to basechange with coefficients*, Sep. 2022, arXiv:2108.03545.
6. P. J. Haine, M. Porta, and J.-B. Teyssier, *The homotopy-invariance of constructible sheaves*, Homology Homotopy Appl., vol. 25, no. 2, pp. 97–128, 2023. DOI: 10.4310/hha.2023.v25.n2.a6, arXiv:2010.06473.
5. P. J. Haine, *On the homotopy theory of stratified spaces*, Ann. Sci. Éc. Norm. Supér. (4), vol. 57, no. 2, pp. 351–384, 2024, arXiv:1811.01119.
4. C. Barwick, S. Glasman, and P. J. Haine, *Exodromy*, Aug. 2020, arXiv:1807.03281. Includes the contents of the four papers arXiv:1812.11637, arXiv:1901.09414, arXiv:1904.01877, and arXiv:1904.09966.
3. S. Devalapurkar and P. J. Haine, *On the James and Hilton–Milnor Splittings, and the metastable EHP sequence*, Doc. Math., vol. 26, pp. 1423–1464, 2021, arXiv:1912.04130.
2. V. Guillemin and P. Haine, *Differential forms*. World Scientific Publishing Co. Pte. Ltd., Hackensack, NJ, 2019, pp. xvi+256, ISBN: 978-981-3272-77-4. DOI: 10.1142/11058.
1. S. Fomin, R. Shankar, P. Haine, and V. Chugunov, *Stability analysis of non-Newtonian rimming flow*, Appl. Math. Model., vol. 40, no. 4, pp. 2999–3010, 2016. DOI: 10.1016/j.apm.2015.09.088.

Lecture Series

June 24–28, 2024	Masterclass on Exit Paths and Stratified Homotopy Types, Københavns Universitet <i>Exodromy beyond conicality</i>
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August 16–20, 2023 **Symplectic Paradise Summer School**, Paradise Valley, Montana
From stratifications to singular Lagrangians

Selected Talks

- November 12, 2024 **Algebraic Geometry Seminar**, Johns Hopkins
Reconstructing schemes from their étale topoi
- October 28, 2024 **RTG Seminar on Arithmetic Geometry**, UC Berkeley
- September 2024 **Anabelian and Motivic Homotopy Theory**, Universität Heidelberg
Reconstructing schemes from their étale topoi
- September 17, 2024 **Seminar on Commutative Algebra and Algebraic Geometry**, UC Berkeley
Reconstructing schemes from their étale topoi
- September 2024 **Toposes in Mondovì**, Grothendieck Institute
Reconstructing schemes from their étale topoi
- August 27, 2024 **Enumerative Geometry Beyond Spaces**, Banff International Research Station
Interactions between homotopy theory and algebraic geometry
- May 9, 2024 **Szygies and Mirror Symmetry Virtual Seminar**
An introduction to “Exodromy beyond conicality”
- April 17, 2024 **Algebraic Geometry Seminar**, UC Davis
Exodromy in topology and applications
- March 17, 2024 **Lloyd Roeling Conference**, University of Louisiana at Lafayette
Exodromy in topology and applications
- December 12, 2023 **Category Theory Seminar**, Johns Hopkins
How to invent pyknotic/condensed mathematics
- December 11, 2023 **Topology Seminar**, Johns Hopkins
Exodromy beyond conicality
- November 6, 2023 **Algebra Seminar**, University of Southern California
On Voevodsky’s reconstruction theorem
- October 20, 2023 **Algebra & Number Theory Seminar**, University of California Santa Cruz
Weight filtrations from the perspective of homotopy theory
- June 20, 2023 **Arbeitstagung 2023 on Condensed Mathematics**, Max-Planck-Institut für Mathematik, Bonn
Condensed math & exodromy
- May 5, 2023 **Algebraic Topology Seminar**, Columbia
Spectral weight filtrations
- April 24, 2023 **Topology Seminar**, MIT
Spectral weight filtrations

- March 20, 2023 **Mathematics Seminar**, Montana State University
Reconstruction and étale homotopy theory
- February 16, 2023 **Geometry-Topology Seminar**, University of Pennsylvania
Reconstruction and étale homotopy theory
- January 13, 2023 **Spring Opportunities Workshop**, Institute for Advanced Study
Reconstruction in algebraic geometry
- October 18, 2022 **Topology Seminar**, University of California San Diego
New perspectives on the étale homotopy type
- July 28, 2022 **Oberseminar: Higher Topoi and Exodromy**, Universität Regensburg
Microlocal sheaves
- July 7, 2022 **Derived Categories, Arithmetic, and Reconstruction in Algebraic Geometry**, Banff International Research Station
Galois-theoretic reconstruction of schemes and exodromy
- May 13, 2022 **Algebraic Topology Seminar**, UCLA
New perspectives on the reconstruction of schemes and étale homotopy types
- May 6, 2022 **Homotopy Theory Seminar**, University of Pennsylvania
Revisiting classical splitting results
- March 28, 2022 **MUSA Math Monday**, UC Berkeley
The cobordism hypothesis in low dimensions
- February 2, 2022 **Oberseminar: Higher Topoi and Exodromy**, Universität Regensburg
Exit-path categories in algebra and geometry
- January 24, 2022 **Algebra & Geometry Seminar**, Caltech
Stratified étale homotopy theory
- January 11, 2022 **Research Seminar on Algebraic Topology**, Universität Hamburg
Exodromy for ℓ -adic sheaves (or how I got into condensed math)
- November 11, 2021 **Algebraic & Geometric Topology Seminar**, University of Nevada, Reno
Exit-path categories in geometry and topology
- October 30, 2021 **Talbot 202One: Ambidexterity in Chromatic Homotopy Theory**
Lecture 16: Character isomorphisms via tempered cohomology
- May 3, 2021 **Topology Seminar**, MIT
On the homotopy theory of stratified spaces
- February 11, 2021 **Thursday Seminar: Redshift in algebraic K-theory**, Harvard
Introduction to algebraic K-theory
- December 14, 2020 **Research Seminar on Algebraic Topology**, Universität Hamburg
Revisiting classical splitting results

- December 7, 2020 **Algebraic Topology Seminar**, University of Michigan
Stratified étale homotopy theory
- November 3, 2020 **UChicago-Northwestern Topology Seminar**
Stratified étale homotopy theory
- June 2, 2020 **Oberseminar: Integral Homotopy Theory**, Universität Regensburg
Borel Global Algebras
- May 20, 2020 **Motives and What Not**, Motivic Zoom Conference Series
Stratified étale homotopy theory
- May 5, 2020 **SFB Lecture**, Universität Regensburg
New perspectives on étale homotopy theory
- April 28, 2020 **Working Group on Stratified Homotopy Theory**, MSRI
The homotopy theory of stratified spaces
- April 24, 2020 **Working Group on Stratified Homotopy Theory**, MSRI
Intro to constructible sheaves & exit paths
- March 10, 2020 **Pyknotic/Condensed Seminar**, MSRI
Pyknotic spaces
- March 4, 2020 **Pyknotic/Condensed Seminar**, MSRI
Pyknotic sets
- December 2, 2019 **Topology Seminar**, Johns Hopkins
On the homotopy theory of stratified spaces
- October 13, 2019 **AMS Fall Eastern Sectional Meeting**, Binghamton, NY
On the homotopy theory of stratified spaces
- September 10, 2019 **Topology Seminar**, Notre Dame
Stratified spaces, constructible sheaves, & exit-paths
- August 8, 2019 **Workshop on Homotopy Theory**, Mathematisches Forschungsinstitut Oberwolfach
On the homotopy theory of stratified spaces
- October 18, 2018 **Homotopy Harnessing Higher Structures Programme**, Isaac Newton Institute
Constructible étale & analytic sheaves and exit paths
- December 7, 2017 **Homotopy Theory Seminar**, The Ohio State University
Monodromy & Stratified Homotopy Theory

Teaching Experience

- Fall 2024 **Math 256A: Algebraic Geometry** (graduate course), UC Berkeley
- Spring 2024 **Math 250B: Commutative Algebra** (graduate course), UC Berkeley
- Fall 2023 **Math 256A: Algebraic Geometry** (graduate course), UC Berkeley

Fall 2019 **18.821: Project Laboratory in Mathematics, Teaching Assistant, MIT**

Mentoring Experience

Fall 2024 **Undergraduate reading course on homotopy theory & higher category theory, UC Berkeley**

Spring 2024 **Undergraduate reading course on homotopy theory & higher category theory, UC Berkeley**

Spring 2022 **Undergraduate reading course on homotopy theory & higher category theory, UC Berkeley**

2020–2021 **Mentor, MIT Math Department's MIT Grad-Undergrad Math Mentoring Initiative (GUMMI)**
Mentored two undergrads applying to math grad school

2020–2021 **Mentor, MIT Math Department's MIT Grad-Undergrad Math Mentoring Initiative (GUMMI)**
Mentored two undergrads applying to math grad school

2018–2019 **Reading Course Mentor, MIT Department of Mathematics**
Mentored an undergraduate reading course on differential forms and equivariant de Rham theory with Victor Guillemin

Winter 2018 **Directed Reading Program Mentor, MIT Department of Mathematics**
Mentored an undergraduate in a category theory and topos theory reading course

Summer 2017 **$\sqrt{\text{Mathroots}}$ Academic Mentor**
Mentored high school students through the MIT Math Department's $\sqrt{\text{Mathroots}}$ program

Winter 2017 **Directed Reading Program Mentor, MIT Department of Mathematics**
Mentored two undergraduates in reading Emily Riehl's text Category theory in Context

Service & Organizational Activities

Fall 2024 **Faculty co-sponsor, MUSA 174, Student-taught course on category theory, UC Berkeley**

2021–2022 **Co-organizer, Nadler's Geometric Representation Theory Seminar**

Fall 2020 **Co-organizer, Harvard/MIT Thursday Seminar on Condensed Mathematics**

Fall 2020 **Co-organizer, MIT Juvitop Seminar on the Cobordism Hypothesis**

2020–2021 **Co-organizer, MIT Grad-Undergrad Math Mentoring Initiative (GUMMI)**

Summer 2019 **Co-organizer, MIT Reading Group on *An Inclusive Academy***

2019–2021 **School of Science Graduate Student Council, MIT**

Fall 2019 **Co-organizer, MIT Juvitop Seminar on Differential Cohomology**

Spring 2019 **Co-organizer, Miniature Seminar on Factorization Homology**

2018–2021 **Coordinator, MIT PRIMES Circle**

Fall 2018 **Co-organizer, MIT Juvitop Seminar on *Ambidexterity in $K(n)$ -local Stable Homotopy Theory***

Fall 2017 **Organizer, MIT Topology Seminar**

