NEWSLETTER

MATHEMATICS

Harvard University Department of Mathematics

Academic Year 2020-2021

DEPARTMENT OF MATHEMATICS
HARVARD UNIVERSITY

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Message From The Chair

Michael J. Hopkins
George Putnam Professor of Pure and Applied Mathematics
MATHEMATICS DEPARTMENT CHAIR

Dear Friends of the Harvard Math Department,

It has been an eventful and challenging year this year. Our department has thrived and grown, and the challenges have helped bring clarity to what we do and what is important to us. This is the first of what will be an annual newsletter describing the goings on in our department.

We are excited by the many new people that have joined us, among them three new senior faculty members: Laura deMarco, Mihnea Popa and Melanie Matchett Wood. We look forward to the day when we are finally able to actually welcome these new people to our space.

Being removed from our community gave us the opportunity to look at it all from a new perspective. In line with a new FAS priority, we have started a new Diversity, Inclusion and Belonging initiative.

When we return to our building we will do so with new appreciation of each other and of what it means to be together.

You will find here profiles of some people in our department, and pieces highlighting some of the many accomplishments of our department members. I hope you enjoy reading about it all.

With Best Wishes,
Mike

Melanie Matchett Wood

Professor of Mathematics and Radcliffe Alumnae Professor at the Radcliffe Institute for Advanced Study

Melanie Matchett Wood has recently joined the faculty as Professor of Mathematics and a Radcliffe Alumnae Professor at the Radcliffe Institute for Advanced Study. This year, Dr. Wood received the prestigious Alan T. Waterman Award, the highest honor given by the National Science Foundation to early-career scientists and engineers. Dr. Wood is the first woman to receive the Waterman in Mathematics.

Dr. Wood earned a B.S. in Mathematics from Duke University, a C.A.S.M. from the University of Cambridge, and a Ph.D. from Princeton University. She also received an American Institute of Mathematics Five-Year Fellowship for her dissertation, one of two fellowships awarded yearly for top mathematics Ph.D.'s in the US. Dr. Wood has been awarded a Packard Fellowship for Science and Engineering, the AWM-Microsoft Research Prize in Algebra and Number Theory, a Sloan Research Fellowship, and an NSF CAREER award. She was a member of the inaugural class of Fellows of the American Mathematical Society. Dr. Wood is on the editorial board for several journals including the Journal of the American Mathematical Society and Duke Mathematical Journal. She serves on the Council of the American Mathematical Society.

Previously, Dr. Wood has been a Vilas Distinguished Achievement Professor at the University of Wisconsin-Madison and a Minerva Distinguished Visitor at Princeton University.

Dr. Wood studies number theory, working on centuries-old mysteries about patterns in the prime numbers and how numbers factor into primes. To answer these questions, she develops methods that combine ideas from across mathematics, using geometry, topology, analysis, and probability. She studies the statistical behavior of how factorization works in different systems of numbers and investigates the statistical variance by exploring the geometry and topology of the space of possible number systems. Dr. Wood has expanded classical ideas from the probability theory of random numbers to develop a new probability theory of random algebraic structures. This probability theory of random algebraic structures can then be used to analyze the observations we have from exploring the space of possible number systems.

Describing her current research program and its motivations, Dr. Wood explains, "I'm excited to try to understand the distributions of symmetry groups

that arise as we look over a range of mathematical objects, whether it is looking at Galois groups of certain extensions of number fields or homology or fundamental groups of topological spaces. Mathematicians define all sorts of groups associated with mathematical objects, from class groups of number fields, cokernels of maps, Galois groups of field extensions, homology, and fundamental groups of topological spaces. I'm interested in the question: which groups arise and how often? As we stare out into the universe of mathematical objects, what groups do we see and how often? And what does the distribution of groups we see arising from a particular construction tell us about the construction itself?"

Dr. Wood brings to Harvard's math department a strong track record of mentoring undergraduate students as well as talented high school students through the numerous outreach programs and initiatives she's led. She explains, "I'm always excited to get students, both graduate and undergraduate, working on problems related to the questions that ntiers of our knowledge."

Dori Bejleri

Benjamin Peirce Fellow

Benjamin Peirce Fellow and NSF Postdoctoral Fellow Dori Bejleri arrived at Harvard in 2019. Prior to joining the MATH department, Dori earned a Ph.D. from Brown, followed by a year of postdoctoral work at MIT. He teaches undergraduate and graduate level courses as well as co-organizing the Harvard / MIT Algebraic Geometry Seminar.

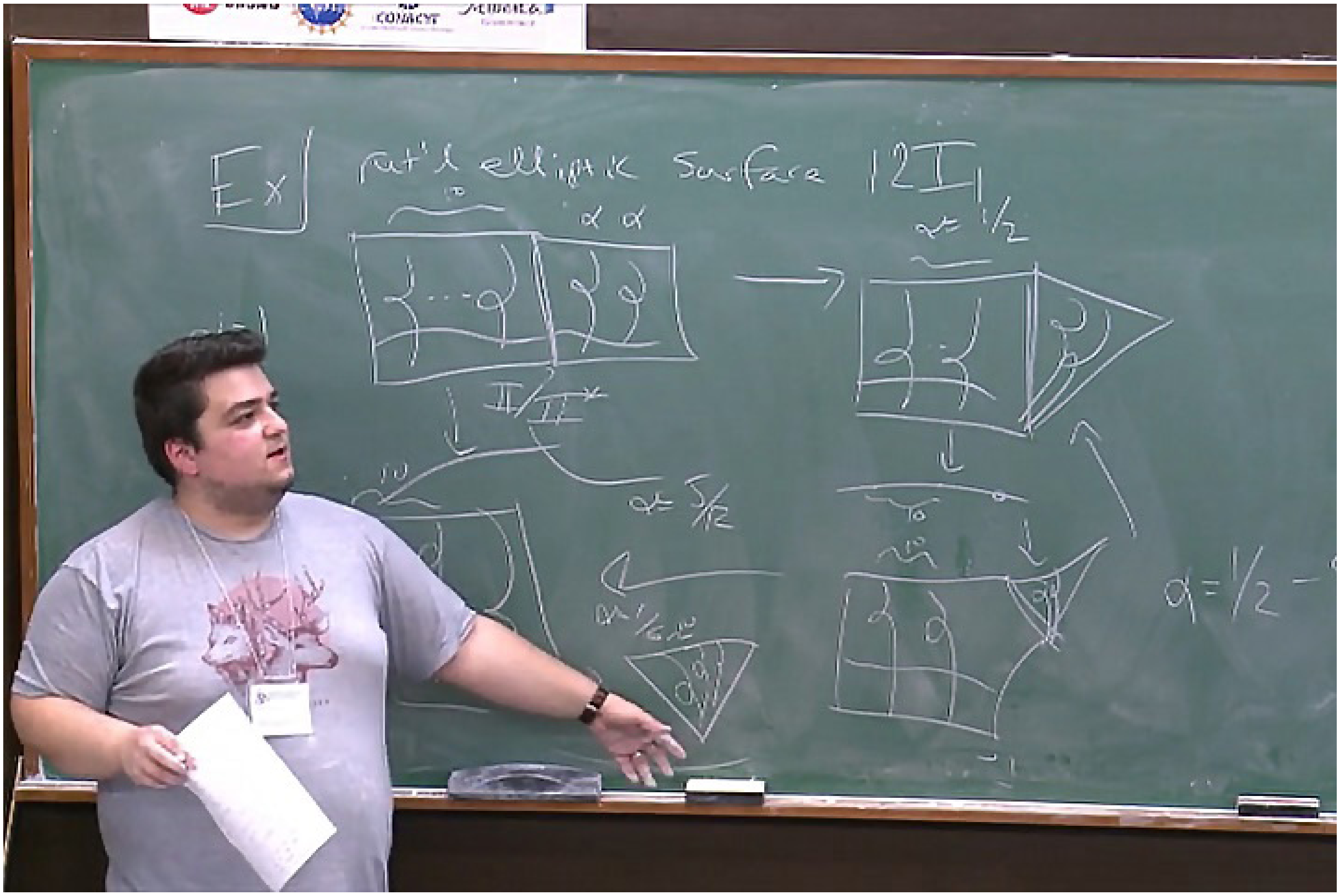
In addition to his academic pursuits, Dori has enjoyed an avid, life-long interest in music. Not one to be limited by narrow taste, Dori is an appreciator of diverse genres, from jazz and folk to hardcore punk. But he's not just a fan, he's also an experienced musician. After years of performing in numerous bands in his youth, Dori has shifted to being a recording artist in his spare time, focusing in particular on solo jazz guitar.

Dori and his wife Jen also like playing board games and prior to the lockdown, enjoyed co-hosting game nights with their big fluffy dog, Grizzly. In the classroom, Dori enjoys creating a space of dynamic interaction with students.

"I definitely thrive in that classroom energy and environment and I hope to help my students thrive in it too." He says that one method he finds particularly useful is to give students a sense of the story of math, by creating "a coherent narrative around the material." He explains, "Especially in mathematics, I think it's important to motivate the definitions, proofs, and concepts with some idea of how we arrived at them, or better yet, with explicit examples." Developing "a narrative or general story" can be a mnemonic device for students as well. "I also think that this approach makes learning more engaging for students."

Dr. Bejleri's research program is focused on the study of moduli spaces in algebraic geometry. He explains, "moduli spaces encode the geometry of parametrizations of some collection of objects of interest. The points of the moduli space classify the objects of interest and paths within the moduli space correspond to continuous deformations of the objects. The types of questions I'm interested in involve what happens when you move off to the boundary of the moduli space, that is, when you deform an object so much it breaks into something degenerate."

"My current focus is on moduli spaces of higher dimensional algebraic varieties. Moduli of 1-dimensional algebraic varieties have been the subject of intense study for the past 150 years or so. Of course, there are still plenty of open questions but we have a very good understanding of these

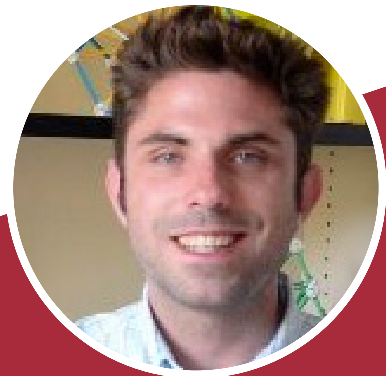


moduli spaces. By contrast, moduli spaces of 2-dimensional or higher algebraic varieties are quite poorly understood. We know that the moduli spaces can be arbitrarily complicated in a precise sense and that the full classification question is completely out of reach even in dimension 2. The goal of my current program is to find some structure in this wild terrain of higher dimensional moduli theory and develop tools to study these spaces in specific examples."

Looking back on a year of unprecedented challenges, and looking forward to what comes next, Dori Bejleri is optimistic about the future of math education. "I think there have been several positive changes to the math community in response to the pandemic and I hope they are lasting. Education is more accessible than ever now and there are so many courses, seminars, and professional development events now open to people who wouldn't have had access to them before. While I am immensely looking forward to going back to teaching and attending these events in person again, I hope that as a community we continue to prioritize making math education open and freely accessible to such a wide audience."

Brendan Kelly

Senior Preceptor



Senior Preceptor Brendan Kelly is completing his seventh year in the department. Dr. Kelly taught and earned a doctorate at the University of Utah before coming to Harvard in 2014. In his spare time, Brendan pursues his longtime interest in theater.

Dr. Kelly specializes in instructional and curriculum design, working closely with Robin Gottlieb and the preceptor team to "coordinate students' early mathematical experiences at Harvard." Brendan's approach to teaching might be described as both practical and dialectical. He explains, "Because students learn mathematics by doing mathematics, I frame my classes around carefully sequenced questions that provide opportunities for students to grapple with core mathematical ideas and confront their misconceptions. I advertise learning to my students as a two-step process: first, you get confused and then you get unconfused."

Broadly, Brendan considers his primary professional goal to be equipping students with the "quantitative skills and productive mathematical dispositions necessary to solve important problems our world faces." A recent example of this commitment to engaged scholarship is the Math M course he designed and taught in Fall 2020. The purpose of the course is to illuminate the importance of mathematics in finding solutions to critical social problems. In four components, students engaged with pressing exigencies in different sectors of public concern and met with industry leaders to discuss how mathematics is central to solving those problems.

In the first unit, students considered the question of electrifying cars in the US as a way to combat global climate change. They met with Sam Houston from the Union of Concerned Scientists to discuss different facets of the problem and the utility of mathematics in analyzing potential solutions. Next, students evaluated the feasibility of a proposal by Boston City Council Member Michelle Wu to make the MBTA free for all passengers. They later met with Council Member Wu and ultimately developed a public policy suggestion using their mathematical analysis. For their next project, Dr. Kelly's Math M students used data from the National Snow and Ice Data Center to predict the rate of Artic sea ice degradation. As part of their model building process, students engaged with multi-variable functions for the first time. They later met with Fran Ulmer, Chair of the United States Arctic Research Commission, who helped students better understand the dramatic consequences of climate change in the arctic. To enable them to see the importance of authentic optimization problems in the business world, students' last project was focused on devising a pricing strategy for a new product at LL Bean. Kirsten Piacentini, the VP of Merchandise Planning and Inventory Management from LL Bean, provided the class with data for their project and met with students to discuss important metrics that retailers use to focus their business strategy.

Undergraduate Studies in Mathematics

Dusty Grundmeier

ASSOCIATE SENIOR LECTURER

Assistant to the Director of Undergraduate Studies

The undergraduate program has been significantly growing over the last few years. We currently have 253 concentrators, 140 of which are primary concentrators. This year, we welcomed 65 new concentrators, including primary, joint, and secondary concentrators. We also had 20 students write senior theses this last year.

Careers

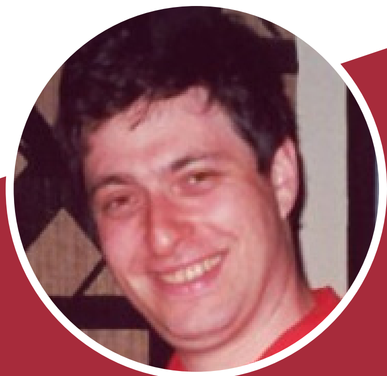
In May 2020, we had a graduating class of 60 students (36 primary concentrators and 24 secondary concentrators), pursuing a range of endeavors from graduate school to finance to the seminary. Approximately half of graduating seniors went directly to graduate studies, including top programs in mathematics, economics, environmental science, computer science, and physics. We had 6 students win prestigious National Science Foundation Graduate Research Fellowships. Among our graduates immediately pursuing careers in business, many have been hired for competitive positions in finance, software engineering, teaching, and more.

Prizes and Awards

For the Academic Year 2019-2020, CJ Dowd, Serina Hu, Kenz Kallal, and Amal Mattoo were invited to Phi Beta Kappa. Peter Chen, Vaughn McDonald, and Filippos Sytilidis won the David Mumford Undergraduate Mathematics Prize for the most promising senior concentrators in mathematics. Natalia Pacheco-Tallaj won the Herb Alexander award. Kim Nguyen, Savvy Raghuvanshi, and Lucy Wang won the Robert Fletcher Rogers Prizes for the best Math Table talks during the academic year. Anne Carlstein and Emily Jia won The Friend's Prize. Zihong Chen won the Thomas Temple Hoopes Prize Winner for excellent undergraduate work.

This year, Mikayel Mkrtchyan was awarded the David Mumford Prize. Hanna Mularczyk won the Alexander Prize. Hanna Mularczyk and Richard Xu won the Robert Fletcher Rogers Prizes. Lux Zhao and Kenz Kallal received the Friends Prize. Alec Sun and Fan Zhou won the Wister Prize. Serina Hu was awarded the Highbridge Prize and Lux Zhao won the Taliesin Prize. We congratulate them, and all of our undergraduate concentrators, on their hard work and look forward to seeing what they accomplish in the future.

Graduate Studies in Mathematics



Mark Kisin
Perkins Professor of Mathematics
Director of Graduate Studies

Dear Friends,

This past year has required a huge amount of flexibility and innovation in our graduate program. Our graduate students have been attending classes, teaching calculus sections and interacting with their advisors remotely, online. Our program currently has 55 graduate students all of whom have adapted to these changes and are successfully engaged with learning and research. Of these students, 34 are international, and a number are in different time zones, which creates extra challenges.

While remote, our students continued to receive funding from the department and University and some received grants from the National Science Foundation, the U.S. Department of Defense, Kwanjeong Educational Foundation, Forethought Foundation, and the PD Soros Fellowship. In particular, the department has continued to receive a generous contribution from the Putnam family that has provided support to 14 students this year. This funding is greatly appreciated and has a significant impact on the work we do.

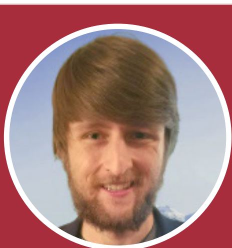
We welcomed 12 new students in the fall. Unfortunately, our international G-1 students have been unable to enter the US and have been spending their first year "at Harvard" from locations around the globe. We look forward to being together on campus soon.

Ten students will be graduating this year. They have made tremendous efforts to continue their research and make progress on their dissertations while engaging in job searches. We are pleased that these searches were as successful as in previous years.

This year we received 388 applications for the math PhD program which is a 29% increase from last year. We are encouraged by this surge in interest in the program and are pleased with the level of talent shown by the applicants. Our goal is to continue to enroll those with the strongest math aptitude and offer them a rewarding and engrossing doctoral experience as they pursue their mathematics careers.

-Mark Kisin

Introducing First Year Graduate Students



Grant Barkley

Undergraduate Affiliation:
North Carolina State University at Raleigh

Research Interests:

I am interested in problems related to Lie and quiver representation theory. Currently, I am working with closure operators on root systems of infinite Coxeter/Weyl groups which have conjectural properties that would elucidate the geometry of infinite root systems (and perhaps finite root systems as well). In particular, I would like to use this work to understand cluster algebras associated to quivers and to construct generalized Bruhat decompositions for Kac-Moody groups and their flag varieties. Related topics that interest me involve the geometric representation theory of reductive groups (like Deligne-Lusztig theory or geometric Satake), and the local and geometric Langlands correspondences. In addition to geometric/cohomological group actions, I am also interested in other realizations of algebraic structures (think E8 with the octonions and the monster group with the moonshine module, but not limited to those).

Taeuk Nam

Undergraduate Affiliation:
University of British Columbia

Research Interests:

My mathematical interests are, broadly, in algebraic geometry, algebraic number theory, and representation theory, as well as the interplay between these fields. Currently, I am focusing on learning towards the geometric Langlands program. Other directions that I am interested in include moduli spaces/stacks and applications thereof to arithmetic situations (for example, studying some class of modular forms as sections).

Yuhan Jiang

Undergraduate Affiliation:
University of California-Berkeley

Research Interests:

Combinatorics and algebraic number theory

Wyatt Reeves

University of Texas, Austin
MIT

Research Interests:

I'm interested in geometry and representation theory. Within geometry I'm more interested in algebraic geometry and algebraic topology than I am in something like geometric analysis. I did my undergrad thesis on the Kazhdan-Lusztig conjectures. Here are some theorems that I like: the Borel-Weil theorem, Bezout's theorem, Stokes' theorem, the divisor line bundle correspondence, the fact that Eilenberg-Maclane spaces.

Sanath Devalapurkar

Undergraduate Affiliation:
MIT

Research Interests:

I'm interested in algebraic topology and algebraic geometry. Recently I've mostly been interested in homotopy theory and its relations to adjacent areas like arithmetic geometry. I am also interested in geometric representation theory and how homotopical tools can be used in this area. I'd like to eventually understand the perspectives on all of these things (homotopy theory, geometric rep theory, etc) from the perspective of mathematical physics.

Keeley Hoek

Undergraduate Affiliation:
Australian National University

Research Interests:

My math interest majorly lies in the field of algebraic combinatorics and enumerative combinatorics. Specifically, I am interested in solving discrete problems related to polytopes, posets, and graphs.

Xinle Clair Dai

Undergraduate Affiliation:
University of Waterloo

Research Interests:

I'm interested in symplectic geometry, low-dimensional topology, and mirror symmetry.

Wanchun Rosie Shen

Undergraduate Affiliation:
University of Waterloo

Research Interests:

I am interested in birational geometry and complex geometry. Currently I am learning Hodge theory and its applications to algebraic geometry.

Michael Kural

Undergraduate Affiliation:
MIT

Research Interests:

I am primarily interested in studying number theory, although I am also interested in other subjects such as algebraic geometry. I am drawn to the prospect of solving problems and understanding concepts in number theory using tools from other areas of math. As such, working at the intersection of number theory and other fields (for example in arithmetic statistics or in arithmetic geometry) interests me.

Jit Wu Yap

Undergraduate Affiliation:
National University of Singapore

Research Interests:

I am interested in number theory and in particular arithmetic geometry.

Jiyang Johnny Gao

Undergraduate Affiliation:
MIT

Research Interests:

My math interest majorly lies in the field of algebraic combinatorics and enumerative combinatorics. Specifically, I am interested in solving discrete problems related to polytopes, posets, and graphs.

Dingding Dong

Undergraduate Affiliation:
University of Chicago

Research Interests:

Combinatorics

Student Spotlight

Interview with Morgan Opie

Morgan Opie
Graduating PhD Student

Born on nearby Cape Cod, Morgan Opie is part of the 2021 class of graduating PhD students. She studied math at the University of Massachusetts and the University of Cambridge before coming to Harvard in 2015. She talked with us about her path to mathematics, her current and future research projects, and about insights gleaned from an historically challenging year.

What originally drew you to mathematics? Did you always know you wanted to study math?

My interest in pure math didn't really crystalize until my second year at UMass Amherst. But, in retrospect, I think I got excited about "higher math" the summer before I started at UMass. I took summer math classes (Math 21a and 21b) at Harvard Summer School. I did this because I wanted to do junior-level physics coursework at UMass, but I didn't have the math background: I'd exhausted math offerings at CCCC, and hadn't been able to take either multivariable calculus or linear algebra, which are pretty important for topics like advanced electricity and magnetism, for example.

I really enjoyed immersing myself in math again that summer. I was exposed to new topics -- like complex numbers – which fascinated me. We even saw a few proofs in 21b. I saw a glimpse of this structured, logical world that existed beyond the basic math I knew and I wanted to see more of it. So, when I enrolled at UMass, I decided to take two math classes which weren't really necessary for my physics plans (differential equations and complex analysis).

In these classes, I met a bunch of math majors, who were taking even more abstract classes. I talked to them about their courses and felt like I could do what they were doing. So, I decided I wanted to take a group theory class and a real analysis class the next semester. Some of my teachers and friends said it would be a lot, maybe too much, to take these classes with no pure math background. But I had one friend from my physics classes who was really confident in me. “It will be easy for you. You get these concepts really easily,” he said. That support was really important for me, because we’d worked together on a lot of problem sets and I felt like he knew my abilities better than my advisors or the other students who said it would be really difficult.

It wasn’t exactly easy, but I worked really hard and did well. Doing proofs, I felt like everything just clicked in my brain in a way that no other topic had before. I took Real Analysis with Professor Andrea Nahmod, who’s a close collaborator of Gigliola Staffilani at MIT. She was super inspiring. She told me “Never close your mind”, meaning that I should keep learning new things even if they didn’t fit into my “career plan”. So, even though I was planning to pursue theoretical physics, I decided to do more math the next fall. I actually went way overboard with the math and had no time for physics, and that was that.

I took advanced courses on algebra, topology, and analysis the next fall. At some point that semester – fall 2012 – I sort of knew I would be a mathematician. The abstract algebra course, with Professor Jenia Tevelev, was the most challenging because I had the least background for it and it was very face-paced. But Jenia was an amazing lecturer and I loved it and really wanted to keep up. I liked abstract algebra better than any topic I’d seen before.

I threw myself into the course and enrolled for the second semester of that sequence. I decided to take an extra year at UMass, so I would be a competitive applicant for math PhD programs. The summer after my second year, I did research with Jenia. He gave me an amazing problem to work on: it had a computational component, but also an open-ended theoretical component. I learned to use the computer algebra program Macaulay2 during the first weeks, while I learned more background about algebraic geometry and moduli spaces of curves which I’d need for the more theoretical stuff. By the end of the summer, I had disproved a conjecture of Jenia, which made me feel confident I could do math. I worked furiously on writing up my result, and by the time I applied to grad school the next fall, I had a short paper in algebraic geometry.

I came to grad school planning to do algebraic geometry, but somewhere along the way I got interested in homotopy theory. I think it started at a conference the summer before I started grad school, where I heard Jacob Lurie give a talk about “doing algebra with spectra” (i.e. derived algebraic geometry).

I was fascinated by this idea and wanted to know more. But it took me a while to act on this. I didn’t pass my quals my first semester of grad school, and I felt really down about this, although everyone was super nice and told me it didn’t matter. But it made me feel like I shouldn’t really talk to professors because I wasn’t up to par yet. So I didn’t really try to talk to anyone new or pursue my newfound interest in homotopy theory.

However, the summer after my first year, I got up the courage to ask Mike Hopkins for a reading assignment. I met with him and told him about my background, and he suggested some Quillen’s papers on algebraic K-theory. I initially thought I might do my minor thesis with him, but once I started reading the papers I felt like I wanted to do a deeper dive and needed more background for it. So I kept talking to him in the fall, and eventually when I needed an advisor signature on a form, I asked him to sign it. So I guess that’s how I ended up being Mike Hopkins’ student!

Can you tell me about your dissertation project?

My dissertation is about vector bundles in topology. More specifically, it's about complex rank 3 topological vector bundles on CP5. Vector bundles are classical, fundamental objects throughout geometry and topology. My thesis has two directions: one to do with the classification of complex rank 3 topological vector bundles on CP5 and the other is about concretely constructing such objects.

What did you find compelling about that topic?

One of the things that I love about my thesis topic is that it blends a lot of complicated machinery with a very classical topic. I love homotopy theory because of its complexity, the way it introduces massive pieces of theory that apply very generally. But I'm also a pretty concrete problem solver at heart. I like to be able to explain what I'm doing to other mathematicians and I like to feel that I can really get my hands on at least some of the objects I'm working with. Vector bundles are very concrete and classical, things that I have pretty good intuition for. But my thesis project has brought me in contact with quite a lot of complex, modern mathematics. So it's the best of both worlds for me.

I also like this project because of all the future directions and ideas it has given me. It is amazing to feel like I have no shortage of future problems (at least for the next year or so) because my thesis has set me up so well. I really have to thank Mike for guiding me to such an excellent problem and helping me to find my niche.

What's next for you? Are there areas of research or teaching you'd like to pursue?

I'm going to be a Hendrick Assistant Adjunct Professor (a research postdoc) at UCLA starting in the fall. My current project has natural avenues connecting to both chromatic homotopy theory and algebraic geometry, so I'm really excited to pursue these and see where it leaves me.

I'll be working with Mike Hill at UCLA and I'm interested to get more into the nuts and bolts of chromatic homotopy theory with him as I try to unravel some of the mysterious things that have come up in my thesis project. I'm also looking forward to working with a few of his postdocs, whose work seems to be connected to mine in a way that needs clarification. This set-up is really exciting to me because I feel like I have sort of been handed a tangled web of ideas, and my task is to sort it out and find some nice structure in it. This is the sort of thing I'm good at and find really satisfying. It will also be a great opportunity for me to learn about some topics I've wanted to understand better for a long time!

UCLA and the LA area have a lot of strong algebraic geometers working on things adjacent to my work, so I'm looking forward to being in that environment. Hopefully I can be there in-person, so I can sort of osmose into lots of different research groups and really take full advantage of the opportunity.

In terms of teaching, I'm expecting teaching at UCLA to be really different from teaching at Harvard. Class sizes are much larger, for one thing! I also will have regular teaching duties for the first time, really, in my career. I'm hoping to teach some upper-division undergrad courses (for example, abstract algebra!), as well as conquer the challenge of the 100+ person calculus class, which I feel is an important thing to do if you plan to be a professor.

What are your interests or hobbies outside of mathematics?

In non-pandemic times, I love playing board/ card/ role-playing games! I've tried to keep this up on Zoom, but it's not quite the same. During my earlier years of grad school, I'd play board games in the common room almost every week.

I also love getting outdoors and hiking. I've done some hiking in the White Mountains during grad school (although not recently unfortunately) and I'm really hoping to get more into hiking when I'm in California, where things are so beautiful and the weather is so nice.

I also love to read, and during the pandemic I've gotten really into long walks with audiobooks. I was on a Jane Austen / Brontë sisters kick for a while. Now I'm listening to War and Peace. I think dense, long books like that are really great for audiobook format because they go a lot faster and you don't have to take as many breaks and forget all the plotlines.

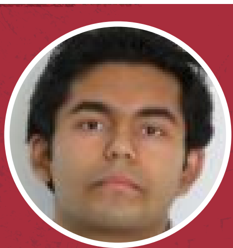
This has been a world-historical year but thankfully it looks like brighter days are just around the corner. Can you share some reflections about your experience as a teacher and scientist during this time?

I think this year has really given me appreciation for the social aspects of mathematics. I think I get a lot of energy from informal discussions with people, hanging out in the common room, having a sense of community and shared purpose with other grad students and the broader department.

I think I've also learned to work through things more this year. I've always been very particular about my work environment. I'm not good at focusing in crowded or noisy settings or if my desk is messy, for example. This year, I've had to work through some serious mental and spatial obstructions to do research and other academic activities. This has taken me a lot of time, and has definitely detracted from my productivity somewhat. But I guess I see a silver lining as this: despite the fact that I haven't been as productive as maybe I would've been during a typical academic year, the time I've spent grappling with my current (pandemic) reality isn't time wasted. Working through this has helped me gain valuable skills about how to adapt better and how to deal with stress and uncertainty. This experience isn't one I can quantify as pages written or theorems proved, but it is valuable both in the context of improving my ability to do research in challenging situations, and, more generally, in terms of helping me to develop valuable life skills. I think it's easy, especially in the academic pressure cooker, to be really hard on yourself for having periods where you are less productive or less motivated. But this is natural and okay and won't ruin your career – and it's inevitable during a global pandemic.

I've been a Derek Bok Center pedagogy fellow this year, so my teaching task is meta-teaching: helping graduate teachers teach, rather than teaching myself. However, I think a lot of the workshops we've done as Pedagogy Fellows have helped underscore a few things about teaching: it's really important to be understanding of your student's life experiences outside of the classroom. For example, if someone has their video off, don't assume it's because they are slacking off. Maybe their wifi is bad; maybe they are in a crowded room and are embarrassed for their whole family to show up to class; maybe they're just having a rough day and feel more able to stay focused without the stress of the camera. I think showing this sort of empathy towards students – and giving them the benefit of the doubt when they might appear to be slacking – is something that's worthwhile to carry forward beyond the pandemic.

Graduating PhD Students



Arka Adhikari
Advisor : Horng-Tzer Yau

Thesis:
Correlated Random Matrices

What's Next : NSF Postdoc at Stanford

Robert Cass
Advisor : Mark Kisin

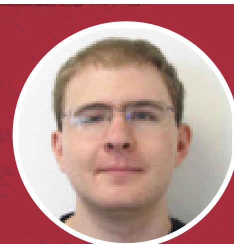
Thesis:
Perverse mod *p* Sheaves on Affine Flag Varieties

What's Next : NSF Postdoctoral Fellow at Caltech 2021-2022, then a three-year Postdoc at the University of Michigan

Lin Chen
Advisor : Dennis Gaitsgory

Thesis:
Nearby Cycles and Dualities in Geometric Langlands Program

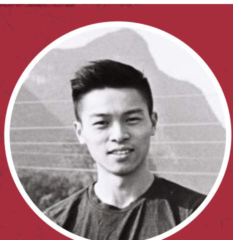
What's Next : Postdoc at Institute for Advanced Study



Benjamin Gunby
Advisor : Yufei Zhao (MIT)

Thesis:
Upper Tails of Subgraph Counts in Sparse Regular Graphs

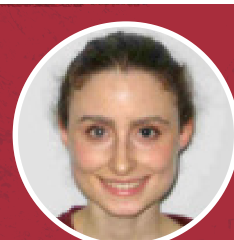
What's Next : Postdoc at Rutgers



Joshua Lam
Advisor : Mark Kisin

Thesis:
The Attractor Conjecture

What's Next : Postdoc at IHES and Stanford



Morgan Opie
Advisor : Michael Hopkins

Thesis:
Complex rank 3 vector bundles on complex projective 5-space

What's Next : Postdoc UCLA

Weifeng Sun

Advisor : Cliff Taubes

Thesis:

Some Analytical Results on the Seiberg-Witten Equations and the Bogomolny Equations

What's Next : Postdoc at Stanford, Szegö Assistant Professor

Ziquan Yang

Advisor : Mark Kisin

Thesis:

Torelli Theorems and Isogeny Theory for Irreducible Symplectic Varieties in Positive Characteristics

What's Next : Postdoc at University of Wisconsin-Madison

Zijian Yao

Advisor : Mark Kisin

Thesis:

Local Galois Deformation Rings and A Function Field Breuil–Mézard Conjecture

What's Next : Postdoc at University of Chicago

Yongquan Zhang

Advisor : Curtis McMullen

Thesis:

Geodesic planes in hyperbolic 3-manifolds

What's Next : Next year at Max Planck Institute for Mathematics in Bonn, Germany, then Postdoc at Stony Brook University

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