

UNIVERSITY OF MILAN

Public selection for recruiting No. 1 tenure track researcher(s) (RTT) for competition sector 01/A2 - Geometria e algebra, (scientific-disciplinary sector MAT/03 - Geometria) at the Department of matematica «Federigo Enriques», (announcement published in Official Gazette No. 97 of 22-12-2023) - Competition code 5467

## [Daniel Kriz] CURRICULUM VITAE

(N.B. CV MUST BE OF UP TO 30 PAGES AND INCLUDE THE DETAILS CANDIDATES CONSIDER USEFUL FOR THE ASSESSMENT.

ALL THE TITLES INSERTED BELOW ARE JUST EXAMPLES THAT CAN BE REPLACED, CHANGED OR COMPLETED)

PERSONAL DATA (DO NOT INCLUDE YOUR PERSONAL ADDRESS AND LANDLINE OR MOBILE PHONE NUMBER)

SURNAME	KRIZ
NAME	DANIEL
DATE OF BIRTH	[ 11, 03, 1992 ]

WEBSITE

<https://sites.google.com/view/dkriz/home>

### QUALIFICATIONS

DEGREE

(Specify full degree name, University, date, etc.)

A.B. (Bachelor of Arts) in Mathematics at Princeton University  
Degree obtained on 03/06/2014, *summa cum laude*, Major GPA: 4.0/4.0, Overall GPA 3.97/4.00  
Senior Thesis Title: *Congruences between Abel-Jacobi Images of Generalized Heegner Cycles and Special Values of p-adic L-functions*

DOCTORAL DEGREE OR EQUIVALENT QUALIFICATION EARNED IN ITALY OR ABROAD / MEDICAL SPECIALISATION DIPLOMA OR EQUIVALENT QUALIFICATION, FOR THE RELEVANT SECTORS, EARNED IN ITALY OR ABROAD

(Specify qualification full name, institution, date, etc.)

Ph.D. (Doctor of Philosophy) in Mathematics 2014-2018 at Princeton University  
Degree (Ph.D. in Mathematics ) obtained on 05/06/2018.  
Thesis Title: *A New p-adic Maass-Shimura operator and supersingular Rankin-Selberg p-adic L-functions*  
Ph.D. defended on 11/05/2018.

M.A. (Master of Arts) obtained as part of the Ph.D. program at Princeton University  
Degree obtained on 26/09/2015.

## RESEARCH CONTRACTS, RESEARCH FELLOWSHIP CONTRACTS, POSTDOCTORAL SCHOLARSHIPS OR SIMILAR CONTRACTS

(Specify, for each contract, university/institution, starting and termination date, etc.)

### Fondation Sciences Mathématiques de Paris Fellow under the “MathInGreaterParis” Program

Host Institution: Institut de Mathématiques de Jussieu - Paris Rive Gauche

Starting and Termination Dates: 01/09/2022-31/08/2024

Position funded by the European Union’s Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 101034255

Won in the 2021-2022 MathInGreaterParis competition <https://www.mathingp.fr/>.

### MSRI/Simons Offsite Postdoctoral Fellow

Host Institution: Massachusetts Institute of Technology

Starting and Termination Dates: 01/08/2021-03/06/2022

Position funded by Simons Foundation Grant Number 814268, MSRI.

Won in a competitive application.

### Instructor in Pure Mathematics and Postdoctoral Fellow

Host Institution: Massachusetts Institute of Technology

Starting and Termination Dates: 01/08/2018-31/07/2021

Position funded by a fellowship from the National Science Foundation (NSF) of the United States of America, NSF award number 1803388.

Won in the 2018 National Science Foundation Mathematical Sciences Postdoctoral Research Fellowship competition in 2018: [https://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=nsf23603](https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf23603)

## TEACHING ACTIVITIES AT ITALIAN OR FOREIGN UNIVERSITIES

(Specify academic year, university, degree course, number of hours etc.)

### Courses Taught

Recitation Leader, 18.06 Linear Algebra, Massachusetts Institute of Technology.  
Spring 2021. 3 ECTS, 15 students.

Role: Reviewed material from the lecture, worked out example exercises in class, created in-class problem sheets for students to work on and present under my supervision, guided students on exercises and to review course material from the lectures.

Instructor, 18.784 Seminar in Number Theory, Massachusetts Institute of Technology.  
Fall 2020. 6 ECTS, 9 students.

Role: Led an introductory, seminar-based course on algebraic number theory in the first half of the semester, organized, guided and gave feedback on student-led presentations and student-written papers on introductory graduate-level topics in the second half of the semester.

Recitation Leader for three recitation sections, 18.02 Multivariable Calculus, Massachusetts Institute of Technology.

Fall 2019. Each recitation credit = 3 ECTS, total semester credit = 9 ECTS, total 61 students.

Role: Reviewed material from the lecture, worked out examples, created in-class problem worksheets for students to work on and present solutions for, guided students and helped them review course material from the lectures.

Graduate Student Section Instructor, MAT 201 Multivariable Calculus.

Princeton University, Fall 2017. 3 ECTS, 40 students.

Role: Reviewed material from the lecture, worked out examples, created in-class problem worksheets for students to work on, guided students and presented solutions.

Seminar Organizer

Organizer of MIT Iwasawa Seminar, Fall 2020-Spring 2021.

MIT STAGE Seminar, Spring 2021 on “Crystalline Cohomology and Prismatic Cohomology” (co-organizer with Bjorn Poonen, Ziquan Yang and Zhiyu Zhang).

Seminar webpage: [https://math.mit.edu/nt/old/stage\\_s21.html](https://math.mit.edu/nt/old/stage_s21.html)

MIT Stage Seminar, spring 2020 on “p-adic Modular Forms” (co-organizer with Bjorn Poonen and Zhiyu Zhang).

Seminar webpage: [https://math.mit.edu/nt/old/stage\\_s20.html](https://math.mit.edu/nt/old/stage_s20.html)

Directing Undergraduate Research Projects

Directed Undergraduate Research Opportunity (UROP <https://uop.mit.edu/>) at the Massachusetts Institute of Technology

Fall 2021 on “p-converse theorems for supersingular CM elliptic curves”

Undergraduate student: Alan Peng

Directed UROP on “Rubin-type Formulas and Supersingular p-adic L-functions” at the Massachusetts Institute of Technology

Fall 2020

Undergraduate Student: Alan Peng

Directed research project with undergraduate Merrick Cai at the Massachusetts Institute of Technology

Fall 2019 and Fall 2020

Undergraduate Student: Merrick Cai

Resulted in the paper Factorization of measures and applications to the weak Goldfeld conjecture by Merrick Cai, <https://arxiv.org/abs/2108.06034>.

**ATTESTED TRAINING OR RESEARCH ACTIVITIES AT QUALIFIED ITALIAN OR FOREIGN INSTITUTIONS**  
(Specify academic year, institution, course, period, etc.)

Pedagogical Training

MAT 500, Effective Mathematical Communication, Fall Semester 2015-2016 at Princeton University.

I completed this semester-long course on effectively teaching mathematical courses, writing mathematical research and expository articles and giving mathematical talks.

#### ORGANISATION, SUPERVISION AND COORDINATION OF NATIONAL AND INTERNATIONAL RESEARCH GROUPS, OR PARTICIPATION IN THEM

(For each entry, specify year, role, research group, etc.)

##### Directing International Undergraduate Research Programs

Advisor for the 2014 Duluth Research Experience for Undergraduates (REU) Program  
Description: The Duluth REU Program is an internationally-recognized summer research program taking place in Duluth, Minnesota, USA which is open to both national and international undergraduate students.

Role: I served as program advisor in the summer of 2014. This involved overseeing the research of 9 undergraduate students, advising them on how to proceed on their research problems and the relevant mathematics.

Program Website: <https://www.d.umn.edu/~jgallian/REU.html>

In my year of 2014, the students published 10 papers in journals such as *Journal of Number Theory*, *Discrete Mathematics*, *Journal of Combinatorial Theory B* and *Electronic Journal of Combinatorics*.

Program Bibliography: <https://www.d.umn.edu/~jgallian/progbib.html>

##### High School Outreach and Direction in International High School Research Programs

Directed a research project in MIT's PRIMES program (an international research program for high school students <https://math.mit.edu/research/highschool/primes/index.php>).

Students: Eric Shen and Kevin Wu

Project: "Congruences between Logarithms of Heegner Points"

#### SPEAKING AT NATIONAL AND INTERNATIONAL CONFERENCES AND CONVENTIONS

(Specify conference/convention title, date, etc.)

##### Seminar and Conference Talks

Talks in international conferences are in bold.

1. **"On the Maximal Cross Number of Unique Factorization Indexed Multisets,"** Jan. 10, 2013 at the AMS Session on Polynomials, Field Theory and Factorizations, 2013 Joint Mathematics Meetings, San Diego, CA. 10/01/2013. (Also served a session chair during the meeting.)

2. "Congruences between Abel-Jacobi Images of generalized Heegner cycles and special values of p-adic L-functions," Algebraic Geometry Seminar, at the University of Michigan, Ann Arbor, MI, USA, 08/01/2015.

3. **“Congruences between Abel-Jacobi images of generalized Heegner cycles and special values of p-adic L-functions,”** at the AMS special session on Selmer groups (organized by Mireal Ciperiani and Henri Darmon), 2015 Joint Mathematics Meetings, San Antonio, TX, 12/01/2015.
4. “Congruences between Heegner points and twists of elliptic curves,” Number Theory Seminar, at Morningside Center of mathematics, Chinese Academy of Sciences, Beijing, China, 01/07/2015.
5. “Congruences of p-adic L-functions,” Palmetto Number Theory Series XXIV, at Emory University, graduate student plenary speaker, Atlanta, GA, USA, 12/09/2015.
6. “Congruences of p-adic L-functions and applications to algebraic cycles,” Algebraic Geometry and Number Theory Seminar, at Clemson University, Clemson, SC, USA, 01/12/2015.
7. “Introduction to Iwasawa theory” and “A Galois-cohomological proof of Gross’s factorization theorem,” minicourse given at Clemson University, Clemson, SC, USA, 01/12/2015-02/12/2015.
8. **“Congruences of p-adic L-functions and applications to algebraic cycles,” CMS Algebraic Number Theory special session, at the 2015 Canadian Mathematical Society Meeting, Montréal, Canada, 04/12/2015.**
9. “Generalized Heegner cycles and congruences of p-adic L-functions,” Automorphic Forms and Arithmetic Seminar, at Columbia University, New York, USA, 15/04/2016.
10. “A brief history of p-adic L-functions,” Graduate Student Seminar, at Princeton University, Princeton, NJ, 05/05/2016.
11. “Congruences of Heegner points and Goldfeld’s conjecture,” Séminaire Informel, at the Institut des Hautes Études Scientifiques, Bures-sur-Yvette, France, 13/10/2016.
12. “Congruences of Heegner points and Goldfeld’s conjecture,” Séminaire de Géométrie Arithmétique et Motivique, Université de Paris 13, Villetaneuse, France, 18/11/2016.
13. “p-adic Integration and its applications,” Séminaire Mathjeunes, Institut des Hautes Études Scientifiques, Bures-sur-Yvette, France, 26/11/2016.
14. “Congruences of Heegner points and Goldfeld’s conjecture,” Séminaire de théorie des nombres analytique, Institut Henri Poincaré, Paris, France, 28/11/2016.
15. **“Generalized Heegner cycles and congruences of p-adic L-functions,” Conference on Special Cycles on Shimura Varieties and Iwasawa Theory, at the Bernoulli Center at École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland, 31/08/2017.**

16. **“A New p-adic Maass-Shimura operator and supersingular Rankin-Selberg p-adic L-functions,”** Conference on Recent Developments on the Arithmetic of Special Values of L-functions, Bernoulli Center at École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland, 14/12/2017.
17. “A new p-adic Maass-Shimura operator and supersingular Rankin-Selberg p-adic L-functions,” special seminar at Concordia University, Montréal, Canada, 20/01/2018-21/01/2018.
18. “Congruences of Heegner points,” special seminar at McGill University, Montréal, Canada, 22/01/2018.
19. “A New p-adic Maass-Shimura operator and supersingular Rankin-Selberg p-adic L-functions,” Northwestern Number Theory Seminar, Evanston, IL, USA, 19/02/2018.
20. “Emmy Noether and the Methods of Rationality,” Graduate Student Seminar at Princeton University, Princeton, NJ, USA, 10/05/2018.
21. “A New p-adic Maass-Shimura operator and supersingular Rankin-Selberg p-adic L-functions,” Princeton/IAS Joint Number Theory Seminar, Princeton, NJ, USA, 17/05/2018.
22. “A New p-adic Maass-Shimura operator and supersingular Rankin-Selberg p-adic L-functions,” Harvard number theory seminar, Cambridge, MA, USA, 12/09/2018.
23. “A New p-adic Maass-Shimura operator and supersingular Rankin-Selberg p-adic L-functions,” MIT number theory seminar, Cambridge, MA, USA, 13/11/2018.
24. **“A New p-adic Maass-Shimura operator and supersingular Rankin-Selberg p-adic L-functions,”** International Conference on Periods and L-functions, in honor of Gisbert Wusthölz’s Birthday, Yau Center at Sanya, China, 20/01/2019.
25. “Supersingular main conjectures, Sylvester’s conjecture and Goldfeld’s conjecture,” Berkeley number theory seminar, Berkeley, CA, USA, 27/01/2020.
26. “Supersingular main conjectures, Sylvester’s conjecture and Goldfeld’s conjecture,” Princeton/IAS number theory seminar, Princeton, NJ, USA, 06/22/2020.
27. “Supersingular main conjectures, Sylvester’s conjecture and Goldfeld’s conjecture,” MIT number theory seminar, Cambridge, MA, USA, 06/02/2020.
28. “Supersingular main conjectures, Sylvester’s conjecture and Goldfeld’s conjecture,” Harvard number theory seminar, Cambridge, MA, USA, 15/04/2020.
29. “Construction of Katz p-adic L-functions,” MIT STAGE seminar, Cambridge, MA, USA, 13/05/2020.
30. “Supersingular p-adic L-functions and L-functions and converse theorems,” Special Session on “Automorphic Forms and Galois Representations,” AMS Sectional Meeting Fall 2020, virtual meeting, 03/10/2020.

31. “Supersingular Main Conjectures, Sylvester’s Conjecture and Goldfeld’s Conjecture,” Max Planck Institute for Mathematics Number Theory Lunch Seminar, virtual meeting, 05/01/2022.

32. “Supersingular Main Conjectures, Sylvester’s Conjecture and Goldfeld’s Conjecture,” in “Galois Representations, Automorphic Forms and L-Functions” at the Centre International des Rencontres Mathématiques, Luminy, France, 24/06/2022.

33. “Supersingular Main Conjectures, Sylvester’s Conjecture and Goldfeld’s Conjecture,” in Séminaire de Géométrie Arithmétique et Motivicque at University of Paris 13, Villetaneuse, France, 14/10/2022.

34. “Les conjectures principales, la conjecture de Sylvester et la conjecture de Goldfeld,” in Séminaire de Théorie des Nombres at the Institut de Mathématiques de Jussieu, Paris, France, 24/10/2022.

35. “Supersingular Main Conjectures, Sylvester’s Conjecture and Goldfeld’s Conjecture,” in Oberseminar at University of Duisburg-Essen, Essen, Germany, 17/11/2022.

36. “Les conjectures principales, la conjecture de Sylvester et la conjecture de Goldfeld,” in Séminaire d’Algèbre et de Théorie des Nombres at the Laboratoire de Mathématiques de Besançon, Besançon, France, 22/11/2022.

37. “Les formes modulaires p-adiques supersingulières et les fonctions L p-adiques supersingulières,” in Séminaires de Groupes Réductifs et Formes Automorphes at the Institut de Mathématiques de Jussieu-Paris Rive Gauche, Paris, France, 09/01/2023.

38. “Les conjectures principales supersingulières, la conjecture de Sylvester et la conjecture de Goldfeld,” in Séminaire Théorie des Nombres at the Institut de Mathématiques de Bordeaux, Bordeaux, France, 24/02/2023.

39. “Les conjectures principales supersingulières, la conjecture de Sylvester et la conjecture de Goldfeld,” in Séminaire d’Arithmétique at the Unité de Mathématiques Pures et Appliquées at the École Normale Supérieure de Lyon, Lyon, France, 07/04/2023.

40. “Congruent numbers, Sylvester’s conjecture and Goldfeld’s conjecture,” in the Number Theory Seminar at Charles University, Prague, Czechia, 26/04/2023.

41. “Horizontal p-adic L-functions with applications to L-values,” in Oberwolfach workshop Algebraische Zahlentheorie, Oberwolfach, Germany, 27/06/2023.

42. “Serre-Tate Theory,” in Seminar on Igusa Stacks at Université Paris-Saclay, 11/01/2024.

### Invited Talks

1. Invited to give a talk in Arithmetic Geometry Seminar at Università degli Studi di Milano, 29/01/2024.
2. Invited to give a talk in Séminaire de Théorie des Nombres at the Université de Caen, Laboratoire de Mathématiques Nicolas Oresme, 16/02/2024.

### Other Workshops and Conferences Attended

1. “Recent Developments on Elliptic Curves,” at the Clay Mathematics Institute, Mathematical Institute, Oxford University, 26/09/2016-30/09/2016.
2. “2016 Fields Medal Symposium,” at the Fields Institute, 01/11/2016-04/11/2016.
3. “Elliptic curves and modular forms in arithmetic geometry,” Massimo Bertolini’s 60th Birthday Conference, Università degli Studi di Milano, 12/09/2022-16/09/2022.

### **NATIONAL AND INTERNATIONAL AWARDS AND ACCOLADES FOR RESEARCH ACTIVITY**

*(Specify award, date, issuing organisation, etc.)*

Mathematical Sciences Research Institute (MSRI)/Simons Offsite Postdoctoral Research Fellowship, awarded 11/02/2021 by MSRI and the Simons Foundation.

NSF Mathematical Sciences Postdoctoral Research Fellowship, awarded on 29/03/2018 by the National Science Foundation of the United States of America.  
Program Website: [https://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=nsf23603](https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf23603)

NDSEG Postgraduate Fellowship, awarded on 10/04/2014 by the United States Department of Defense of the United States of America.  
Program Website: <https://www.nre.navy.mil/education-outreach/undergraduate-graduate/ndseg-graduate-fellowship#:~:text=The%20National%20Defense%20Science%20and,engineering%20important%20to%20defense%20goals>

NSF Graduate Fellowship, awarded on 31/03/2014 by the National Science Foundation of the United States of America.  
Program Website: <https://www.nsfgrfp.org/>

Barry M. Goldwater Scholarship, awarded on 30/03/2013 by the Barry Goldwater Scholarship and Excellence in Education Foundation.  
Program Website: <https://goldwaterscholarship.gov/>

### **OTHER ACADEMIC AWARDS AND PRIZES**

*(Specify award, date, issuing organisation, etc.)*

Teaching Honor Roll (awarded by Massachusetts Institute of Technology), Spring 2021

George B. Covington Prize in Mathematics (awarded by Princeton University), Spring 2014

Early Election to Phi Beta Kappa Society, Princeton Chapter (offered by the Phi Beta Kappa Society to the top 14 members of the class of 2014 at Princeton University), Fall 2013

Shapiro Prize of Academic Excellence (awarded by Princeton University), awarded 2011 and 2012

International Mathematics Competition for University Students, 3rd Prize, 2011

Nominated for Quin Morton '36 Writing Seminar Essay Prize (awarded by Princeton University), 2010

Top 300 of Putnam Mathematics Competition, 2010

Michigan Mathematics Prize Competition Silver Medal, 2010

National Merit Scholarship Winner (awarded by the National Merit Scholarship Program of the United States), 2010

Presidential Scholar Semifinalist (awarded by the US Department of Education), 2010

Perfect Score on SAT exam, October 2009

United States of America Mathematical Talent Search Silver Medal, 2007-2009

## **SCIENTIFIC PRODUCTION**

### **SCIENTIFIC PUBLICATIONS**

(For each publication, specify the following: authors' names, full title, publisher, date and place of publication, ISBN/ISSN/DOI or equivalent code)

#### **Publications**

1. Supersingular p-adic L-functions, Maass-Shimura Operators and Waldspurger Formulas, *Annals of Mathematics Studies*, (212), 2021, ISBN: 9780691216461.
2. Prime twists of elliptic curves (with C. Li), *Mathematical Research Letters*, vol. 26 no. 4, 2019, DOI: <https://dx.doi.org/10.4310/MRL.2019.v26.n4.a10>.
3. Goldfeld's conjecture and congruences between Heegner points (with C. Li), *Forum of Mathematics, Sigma*, Volume 7, 2019, e15, DOI: <https://doi.org/10.1017/fms.2019.9>.
4. A New p-adic Maass-Shimura operator and supersingular Rankin-Selberg p-adic L-functions, Thesis (Ph.D.)-Princeton University. 2018. 197 pp. ISBN: 978-0438-04870-6, ProQuest LLC.

5. Generalized Heegner cycles at Eisenstein primes and the Katz p-adic L-function, *Algebra and Number Theory*, vol. 10, no. 2, 2016, pp. 309-374, DOI: <https://doi.org/10.2140/ant.2016.10.309>.

6. Field Theories, stable homotopy theory, and Khovanov homology (with P. Hu and I. Kriz), *Topology Proceedings*, vol. 48, 2017, pp. 327-360. ISSN: (Online) 2331-1290, (Print) 0146-4124.

7. A spanning tree cohomology theory for links (with I. Kriz), *Advances in Mathematics*, vol. 255, 1 (April 2014), 414-454, DOI: <https://doi.org/10.1016/j.aim.2014/01/006>.

8. On a conjecture concerning the maximal cross number of unique factorization indexed sequences, *Journal of Number Theory*, 133 (2013) 3033-3056, DOI: <https://dx.doi.org/10.1016/j.jnt.2013.03.006>.

### Errata

1. Errata to “Supersingular p-adic L-functions, Maass-Shimura Operators and Waldspurger Formulas,” *Annals of Mathematics Studies*, (212), 2021, ISBN: 9780691216461. <https://sites.google.com/view/bookerrata/home>.

### Preprints

All of these works are available on my website: <https://sites.google.com/view/dkriz/home>.

1. Horizontal p-adic L-functions (with A. Nordentoft), <https://arxiv.org/abs/2310.20678>, 2023.

2. The Bertolini-Darmon-Prasanna p-adic L-function via  $q_{dR}$ -expansions, [https://drive.google.com/file/d/1wilQubkYw6zR0s0VbNd16bbgAJULdneD/view?usp=drive\\_link](https://drive.google.com/file/d/1wilQubkYw6zR0s0VbNd16bbgAJULdneD/view?usp=drive_link), 2023.

3. Supersingular main conjectures, Sylvester’s conjecture and Goldfeld’s conjecture, [https://drive.google.com/file/d/1-nBSutYoGazjJrtgVlux32Vph1POXsOc/view?usp=drive\\_link](https://drive.google.com/file/d/1-nBSutYoGazjJrtgVlux32Vph1POXsOc/view?usp=drive_link), 2020.

4. A Galois cohomological proof of Gross’s factorization theorem, [https://drive.google.com/file/d/1FzJuHHnYS05jX\\_XcCLdedig4G-3m-QAV/view?usp=sharing](https://drive.google.com/file/d/1FzJuHHnYS05jX_XcCLdedig4G-3m-QAV/view?usp=sharing), 2015.

Date

18/01/24

Place

Paris, France