

Angelica Babei

APPOINTMENTS

Howard University , Washington, DC Assistant Professor	January 2025 - Present
McMaster University , Hamilton, ON Postdoctoral Fellow (Mentor: Cameron Franc)	Fall 2021 - August 2023
Dartmouth College , Hanover, NH Postdoctoral Researcher (Mentor: John Voight)	Spring 2021 - Summer 2021
Vanderbilt University , Nashville, TN Postdoctoral Scholar (Mentor: Larry Rolin)	Fall 2019 - Summer 2020

EDUCATION

Dartmouth College , Hanover, NH Ph.D. in Mathematics (Advisor: Thomas R. Shemanske) Thesis: <i>On the Arithmetic of Tiled Orders</i>	2019
A.M. in Mathematics	2015
Colgate University , Hamilton, NY B.A. in Mathematics and German	2014

ADDITIONAL EXPERIENCE

Harvard University Center of Mathematical Sciences and Applications , Cambridge, MA Participant, "Mathematics and Machine Learning Program"	September - November 2024
Université de Montréal CRM , Montréal, QC Postdoctoral Fellow, thematic semester "Cohomology in Arithmetic"	Fall 2020 - Spring 2021

RESEARCH INTERESTS

A blend of algebraic number theory and computational methods. More specifically, classical and Hilbert modular forms, modular forms for noncongruence subgroups, Atkin and Swinnerton-Dyer type congruences, quaternionic orders and orders in central simple algebras, and machine learning methods in number theory.

PUBLICATIONS

- Learning Euler Factors of Elliptic Curves* (with Francois Charton, Edgar Costa, Xiaoyu Huang, Kyu-Hwan Lee, David Lowry-Duda, Ashvni Narayanan, and Alexey Pozdnyakov). [\(PDF\)](#)
- The moduli space of representations of the modular group into G_2* (with Andrew Fiori and Cameron Franc). [\(PDF\)](#)
- Machine Learning Approaches to the Shafarevich-Tate Group of Elliptic Curves* (with Barinder S. Banwait, AJ Fong, Xiaoyu Huang, and Deependra Singh). [\(PDF\)](#)
- Supercongruences arising from Ramanujan-Sato Series* (with Manami Roy, Holly Swisher, Bella Tobin, and Fang-Ting Tu). [\(PDF\)](#)

5. *Zeta functions for table algebras and fusion rings with irrational-valued characters* (with Allen Herman). ([PDF](#))
6. *A database of basic numerical invariants of Hilbert modular surfaces* (with Eran Assaf, Benjamin Breen, Edgar Costa, Juanita Duque-Rosero, Aleksander Horawa, Jean Kieffer, Avinash Kulkarni, Grant Molnar, Sam Schiavone and John Voight). In *LuCaNT: LMFDB, computation, and number theory*. Conference, Institute for Computational and Experimental Research in Mathematics (ICERM), Providence, Rhode Island, USA (2023, Jul 10), 285 - 312. ([PDF](#))
7. *Generalized Ramanujan-Sato series arising from modular forms* (with Lea Beneish, Manami Roy, Holly Swisher, Bella Tobin, and Fang-Ting Tu). In *Research Directions in Number Theory: Women in Numbers V* (2024, Jan 10), 87-131. Cham: Springer International Publishing. ([PDF](#))
8. *Families of ϕ -congruence subgroups of the modular group* (with Andrew Fiori and Cameron Franc). *Mathematika*, 69, (2023), 1104 –1144. ([PDF](#))
9. *Computing zeta functions of table algebra orders using local zeta integrals* (with Allen Herman). *Mediterr. J. Math.* 20, 108 (2023). ([PDF](#))
10. *The Riemann Hypothesis for period polynomials of Hilbert modular forms* (with Larry Rolen and Ian Wagner). *Journal of Number Theory*, 218 (2021), 44–61. ([PDF](#))
11. *Metacommutation of primes in Eichler orders* (with Sara Chari). *Acta Arithmetica*, 197:1 (2021), 77–92. ([PDF](#))
12. *Computing normalizers of tiled orders in $M_n(k)$* , Proceedings of the Thirteenth Algorithmic Number Theory Symposium, edited by Renate Scheidler and Jonathan Sorenson, Open Book Series 2, Mathematical Sciences Publishers, Berkeley, 2019, 55-68. ([PDF](#))
13. *Type numbers of orders in central simple algebras*. ([PDF](#))

COMPUTATIONAL PROJECTS

1. Implementing a new environment for Hilbert modular forms in Magma ([github repository](#))
2. Contributor to the [LMFDB](#)

GRANTS AND AWARDS

Simons Laufer Mathematical Sciences Institute (SLMath, formerly MSRI) June 2023
 2023 Summer Research in Mathematics program
 Group members: Bella Tobin, Manami Roy, Holly Swisher, Fang-Ting Tu

TALKS

*Invited talks are marked with **

Learning Euler factors of elliptic curves with transformers October 2024
 Mathematics and Machine Learning Program Closing Workshop, Harvard University CMSA

Supercongruences arising from Ramanujan-Sato Series March 2024
 Southern Regional Number Theory Conference 2024: Celebrating 10 Years!, Louisiana State University

**On symmetries of modular forms* January 2023
 Post-Doc Threads Colloquium, McMaster University

**A family of non-congruence subgroups of the modular group* January 2023
 JMM 2023, AMS Special Session on Quadratic Forms, Modular Forms, and Applications

**A family of ϕ -congruence subgroups* June 2022
 COGENT, Workshop on Cohomology, Geometry and Explicit Number Theory

<i>A family of ϕ-congruence subgroups</i>	June 2022
Algebra and Number Theory Seminar, University of Calgary	
<i>*Solomon zeta functions of table algebras</i>	November 2021
Number Theory Seminar, Oregon State University	
<i>Genus 2 curves with real multiplication and graded rings of Hilbert modular forms</i>	September 2021
Simons Collaboration on Arithmetic Geometry, Number Theory, and Computation	
<i>*Period polynomials, their zeros, and Eichler cohomology</i>	April 2021
Algebra and Number Theory Seminar, Louisiana State University	
<i>*Period polynomials, their zeros, and Eichler cohomology</i>	February 2021
Algebra and Representation Theory Seminar, University of Oklahoma	
<i>*On the partition function modulo 3</i>	January 2021
Joint Mathematics Meetings 2021, AMS Special Session on Quadratic Forms and Theta Functions	
<i>*Zeros of period polynomials for Hilbert modular forms</i>	December 2020
CMS 2020 Winter Meeting, special session on <i>Computations with Arithmetic Groups</i> .	
<i>Counting ideals in Eichler orders: a combinatorial approach</i>	March 2020
Bates College, ME.	
<i>Metacommutation in quaternion orders and actions on the Bruhat-Tits tree</i>	January 2020
Joint Mathematics Meetings 2020, Denver, CO.	
<i>Hilbert modular forms in Magma</i>	August 2019
Number Theory Seminar, Vanderbilt University, Nashville, TN.	
<i>*Type numbers of orders in central simple algebras</i>	November 2018
Five College Number Theory Seminar, Amherst College, Amherst, MA.	
<i>Computing normalizers of tiled orders in $M_n(\mathbb{Q}_p)$</i>	July 2018
Algorithmic Number Theory Symposium XIII, University of Wisconsin, Madison, WI.	

TEACHING EXPERIENCE

<i>Instructor, McMaster University</i>	
Math 1K03 - Advanced Functions	Fall 2021, 2022
Math 1MM3 - Applied Calculus	Winter 2022, 2023
<i>Instructor, Vanderbilt University</i>	
Math 2420 - Methods of Ordinary Differential Equations	Spring 2020
Math 1300 - Accelerated Single Variable Calculus I (2 sections)	Fall 2019
<i>Instructor, Dartmouth College</i>	
Math 22 - Linear Algebra with Applications	Fall 2018
Math 8 - Calculus of Functions of One and Several Variables	Fall 2017
Math 1 - Calculus with Algebra	Fall 2016
<i>Ethics Seminar Facilitator, Dartmouth College</i>	
Topics: Professionalism, Mentoring, Authorship and Peer Review, Data Collection	Fall 2018

PROFESSIONAL ACTIVITIES

- **Mathematics and Machine Learning Program** - Participant September - November 2024
- **Algebra and Algebraic Geometry Seminar** - Co-organizer 2022 - 2023

- **Hilbert Modular Forms Infrastructure Week** July 2021
Organized a 1-week workshop bringing together researchers affiliated with the Simons Collaboration on Arithmetic Geometry, Number Theory, and Computation.
- **Vanderbilt University Online Course Design Institute** June - July 2020
Participated in a 2-week workshop to prepare for planning and teaching an online course. Topics include building sample learning modules, online teaching tools and issues of access, and planning strategies to provide a thriving online learning experience.
- **Vanderbilt Center for Teaching - The Open Classroom** September 2019
Participated in discussion sessions on *Teaching Creativity* and *Active Learning*
- **Dartmouth Algebra and Number Theory Seminar - Organizer** 2015 - 2019
- **Dartmouth Mathematics Women's Tea - Organizer** Fall 2018
- **Dartmouth Center for the Advancement of Learning** August 2018
Participated in a workshop on *Creating an Inclusive Learning Environment*
- **Sage Days 95 : Women in Sage** July 2018
- **Dartmouth Ethics Facilitator Training** Spring 2018
- **Sage Days 87 : p-adics in Sage and the LMFDB** July 2017
Computed Galois splitting models for the LMFDB.
- **2016 NES MAA Vermont Workshop** October 2016
Teaching Calculus Now - Current Trends and Best Practices
- **Dartmouth College Mathematics Teaching Seminar** Summer 2016
Participated in an 8-week course focused on the discussion and implementation of pedagogical materials and philosophies. Topics included planning lessons and courses, student assessments and collaborative learning assignments.

OUTREACH

- **Nashville Math Club - Workshop Co-leader** 2019 - 2020
Knot Theory (September 2019)
Set Theory and the Inclusion-Exclusion Principle (February 2020)
- **Nebraska Conference for Undergraduate Women in Mathematics - Panelist** January 2019
- **Dartmouth Sonia Kovalevesky Day - Panelist** May 2019
- **Dartmouth Sonia Kovalevesky Day - Workshop Co-leader** 2015 - 2018
Cryptography: The Mathematics of Secrets (April 2018)
The Number Games: Survival of the Brainiacs (May 2017)
Complex Networks (April 2016)
Ramsey's Three Friends and Three Strangers (May 2015)
- **Johns Hopkins University : Center for Talented Youth - Workshop Co-leader** 2016 - 2017
The Number Games: Survival of the Brainiacs (May 2017)
Complex Networks (April 2016)
- **Exploring Mathematics Camp at Dartmouth - Workshop Co-leader** August 2016
Developed two week-long workshops for middle and high school students.
Probability and *Knot Theory*

OTHER SKILLS

- Programming skills: Magma, SageMath, Python, MATLAB, Git
- Language skills: native Romanian, fluent English, proficient German, Russian, French