

# Angelica Babei

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## EDUCATION

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

## EMPLOYMENT

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<b>McMaster University</b> , Hamilton, ON	
Postdoctoral Fellow (Mentor: Cameron Franc)	Fall 2021 - August 2023
<b>Dartmouth College</b> , Hanover, NH	
Postdoctoral Researcher (Mentor: John Voight)	Spring 2021 - Summer 2021
<b>Université de Montréal CRM</b> , Montréal, QC	
Postdoctoral Fellow, thematic semester “Cohomology in Arithmetic”	Fall 2020 - Spring 2021
<b>Vanderbilt University</b> , Nashville, TN	
Postdoctoral Scholar (Mentor: Larry Rolen)	Fall 2019 - Summer 2020

## RESEARCH INTERESTS

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A blend of algebraic number theory, combinatorial 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 Bruhat-Tits buildings.

## PUBLICATIONS

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1. *Zeta functions for table algebras and fusion rings with irrational-valued characters* (with Allen Herman). Preprint ([PDF](#))
2. *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). To appear in LMFDB, Computation, and Number Theory (LuCaNT). ([PDF](#))
3. *Generalized Ramanujan-Sato series arising from modular forms* (with Lea Beneish, Manami Roy, Holly Swisher, Bella Tobin, and Fang-Ting Tu). To appear in Research Directions in Number Theory: Women in Numbers V. ([PDF](#))
4. *Families of  $\phi$ -congruence subgroups of the modular group* (with Andrew Fiori and Cameron Franc). *Mathematika*, 69, (2023), 1104–1144. ([PDF](#))
5. *Computing zeta functions of table algebra orders using local zeta integrals* (with Allen Herman). *Mediterr. J. Math.* 20, 108 (2023). ([PDF](#))
6. *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](#))

7. *Metacommutation of primes in Eichler orders* (with Sara Chari). Acta Arithmetica, 197:1 (2021), 77–92. [\(PDF\)](#)
8. *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. [\(PDF\)](#)
9. *Type numbers of orders in central simple algebras*. Preprint [\(PDF\)](#)

## COMPUTATIONAL PROJECTS

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

## GRANTS AND AWARDS

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*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

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*Invited talks are marked with \**

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| <i>*On symmetries of modular forms</i>  | January 2023   |
| Post-Doc Threads Colloquium, McMaster University  |                |
| <i>*A family of <math>\phi</math>-congruence subgroups of the modular groups</i>            | January 2023   |
| JMM 2023, AMS Special Session on Quadratic Forms, Modular Forms, and Applications           |                |
| <i>*A family of <math>\phi</math>-congruence subgroups</i>                                  | June 2022      |
| COGENT, Workshop on Cohomology, Geometry and Explicit Number Theory                         |                |
| <i>A family of <math>\phi</math>-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>Solomon zeta functions of table algebras</i>   | September 2021 |
| Algebra and Algebraic Geometry Seminar, McMaster 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>Metacommutation in Eichler orders</i> PANTS 2019, University of North Carolina at Charlotte, Charlotte, NC.	September 2019
<i>Hilbert modular forms in Magma</i> Number Theory Seminar, Vanderbilt University, Nashville, TN.	August 2019
<i>Type numbers of orders in central simple algebras</i> Joint Mathematics Meetings 2019, Baltimore, MD.	January 2019
<i>*Type numbers of orders in central simple algebras</i> Five College Number Theory Seminar, Amherst College, Amherst, MA.	November 2018
<i>Class and type numbers of orders in central simple algebras</i> Québec-Maine Number Theory Conference, Université Laval, Québec.	October 2018
<i>Computing normalizers of tiled orders in <math>M_n(\mathbb{Q}_p)</math></i> Algorithmic Number Theory Symposium XIII, University of Wisconsin, Madison, WI.	July 2018

## TEACHING EXPERIENCE

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

## PROFESSIONAL ACTIVITIES

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- **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

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- **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

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