# Peter Zenz

*Tamarkin Assistant Professor*

*151 Thayer Street*
*Kassar 015, Brown University*
*Providence, RI 02912, USA*
*peter_zenz@brown.edu*
*https://sites.google.com/view/peterzenz/about-me*


## Research Interests

Analytic number theory, L-functions, automorphic forms, spetral theory, trace functions, arithmetic quantum chaos and related topics

## Employment

since 07/2024 **Tamarkin Assistant Professor**, *Brown University*, USA
Mentor: Junehyuk Jung, Jeffrey Hoffstein

07/2023-07/2024 **Visiting Assistant Professor**, *Stanford University*, USA
Mentor: Kannan Soundararajan

08/2022-07/2023 **Tamarkin Assistant Professor**, *Brown University*, USA
Mentor: Junehyuk Jung, Jeffrey Hoffstein

## Education

09/2017-08/2022 **Ph.D. Mathematics**, *McGill University*, Canada
Thesis: Distribution of Mass of Hecke cusp forms and Quantum Chaos
Advisor: Maksym Radziwiłł and Dimitris Koukoulopoulos

09/2015-03/2017 **M.Sc. Mathematics**, *with distinction*, *ETH Zurich*, Switzerland
Thesis: High Automorphy for Effective Quantum Unique Ergodicity
Advisor: E. Kowalski, D. Koukoulopoulos, M. Radziwiłł

09/2012-06/2016 **B.Sc. Mathematics**, *ETH Zurich*, Switzerland
Thesis: Liouville Function in Short Intervals
Advisor: P. Nelson

## Publications and Research

11/2021 **Quantum Variance for Holomorphic Hecke Cusp Forms on the Vertical Geodesic**
[arXiv:2111.04713], submitted under review

08/2021 **Sharp Bound for the Fourth Moment of Holomorphic Hecke Cusp Forms**
[arXiv:2108.13868], published at IMRN

2024+ **Exponential convergence of closed geodesics in compact hyperbolic manifolds**
(in preparation) joint work with Junehyuk Jung and Insung Park

2024+ **Geodesic Restrictions and Nodal Domains for Dihedral Maass Forms**
(in preparation)

## Talks

### Conferences and Invited Talks

12/2024 **Geodesic Restrictions and Nodal Domains of Cusp Forms**, *Algebra Seminar*, Brown University

03/2024 **On Geodesic Restriction Problems and Sign Changes of Cusp Forms**, *Number Theory Seminar*, Purdue University

03/2024 **Sign Changes of Cusp Forms and Geodesic Restrictions**, *Number Theory Seminar*, UC Davis

10/2023 **On Real Zeros of Holomorphic Cusp Forms**, *Number Theory Seminar*, Stanford University

10/2023 **Sign Changes of Cusp Forms and Geodesic Restrictions**, *Number Theory Seminar*, UIUC

05/2022 **Holomorphic Hecke Cusp Forms and Quantum Chaos**, *Number Theory Seminar*, London

12/2021 **Arithmetic Quantum Chaos and Shifted Convolution Problems**, *Number Theory Seminar*, Copenhagen

12/2021 **Quantum variance for holomorphic Hecke cusp forms on the vertical geodesic**, *Automorphic Forms Seminar*, Renyi Institute

12/2021 **Quantum variance restriction problem for holomorphic Hecke cusp forms**, *2021 CMS Winter Meeting*

12/2021 **Quantum Chaos and Arithmetic**, *Junior Number Thoery Days*, John Hopkins University

10/2021 **Quantum Variance for Hecke Cusp Forms on the Vertical Geodesic**, *Quebec-Maine*

10/2020 **On the Fourth Moment of Holomorphic Cusp Forms**, *Quebec-Maine*

02/2020 **Moments and the Random Wave Conjecture**, *Los Angeles*

### Analytic Number Theory Seminar

05/2021 **Quantum Variance for Hecke Cusp Forms on the Vertical Geodesic**

05/2021 **Quantum Variance for Hecke Cusp Forms on the Vertical Geodesic**

10/2020 **Weak Subconvexity and Mean Values of Multiplicative Functions**

05/2020 **Oppenheim Conjecture and Dirichlet Polynomials**

10/2019 **Moments of L-functions and the Random Wave Conjecture**

10/2017 **High Automorphy for Effective Quantum Unique Ergodicity**

11/2016 **Quantum Unique Ergodicity and the Ramanujan Conjecture**

### Other Seminar Talks

09/2021 **Quantum Ergodicity for the Vertical Geodesic**, *Caltech-Stanford online student seminar*

07/2021 **Eisenstein Series and the Continuous Spectrum**, *Caltech-Stanford online student seminar*

02/2018 **Analytic Conductor and Sub-Convexity Bounds**, *Montreal student seminar*

04/2018 **Trace Functions in Analytic Number Theory**, *Montreal student seminar*

## Conferences and Workshops Attended

10/2023 **Delta symbols and the subconvexity problem**, *American Institute of Mathematics*

10/2022 **Number Theory and Physics**, *Simons Center*

12/2021 **Junior Number Theory Days**, *John Hopkins University*

10/2021 **Québec-Maine Number Theory Conference**, *Online*

12/2020 **2020 Canadian Mathematical Society Winter Meeting**, *Online*

10/2020 **Québec-Maine Number Theory Conference**, *Online*

02/2020 **Number Theory Series in Los Angeles II**, *Occidental College*

10/2019 **Québec-Maine Number Theory Conference**, *University of Maine*

05/2019 **L-functions and Multiplicative Number Theory**, *University of Mississippi*

01/2019 **Trace functions and their applications - Winter School**, *ETH Zurich*

08/2018 **Québec-Maine Number Theory Conference**, *Université Laval*

06/2018 **L-functions: Open Problems and Current Methods**, *Bonn*

06/2018 **Perspectives on the Riemann Hypothesis**, *Bristol*

05/2018 **Probability in Number Theory**, *CRM Montréal*

10/2017 **Québec-Maine Number Theory Conference**, *University of Maine*

10/2016 **Québec-Maine Number Theory Conference**, *Université Laval*

02/2016 **L-functions and Automorphic Forms**, *Heidelberg*

06/2015 **Symposium: 50 years of mathematics at the FIM**, *ETH Zurich*

05/2015 **Analytic Aspects of Number Theory**, *ETH Zurich*

## Awards

Winter 2022 **ISM Scholarship for Outstanding PhD Candidates**

Fall 2019 **Teaching Assistant Award**
for the best TA in the McGill Mathematics and Statistics Department

Fall 2018 **ISM Graduate Scholarship**

## Teaching

Spring 2025 **Instructor**, *Cryptography MATH 1080*, Brown University

Fall 2024 **Instructor**, *Linear Algebra with Theory MATH 540*, Brown University

Fall 2024 **Instructor**, *Calculus I MATH 0090*, Brown University

Spring 2023 **Instructor**, *Cryptography MATH 1580*, Brown University

Fall 2022 **Instructor**, *Complex Analysis MATH 1260*, Brown University

Fall 2022 **Instructor**, *Multi-variable Calculus MATH 180*, Brown University

July 2021 **Instructor**, *Calculus II*, McGill University

June 2020 **Instructor**, *Calculus I*, McGill University

June 2019 **Instructor**, *Calculus I*, McGill University

Fall 2021 **Math Help Desk Teaching Assistant**, *Various Undergraduate Courses*, McGill University

Fall 2021 **Teaching Assistant**, *Calculus II*, McGill University

Fall 2020 **Teaching Assistant**, *Calculus II*, McGill University

Fall 2019 **Teaching Assistant**, *Calculus II*, McGill University

Fall 2018 **Teaching Assistant**, *Calculus II*, McGill University

Fall 2017 **Teaching Assistant**, *Calculus I*, McGill University

Fall 2016 **Teaching Assistant**, *Algebra II*, ETH Zurich, Fields, Galois Theory

Fall 2015 **Teaching Assistant**, *Algebra I*, ETH Zurich, Group Theory, Rings, Modules

## Service

Fall 2024 **Work-group on "Alpha Geometry - Artificial Intelligence in Mathematics"**, *Brown University*

Fall 2024 **Work-group on "Reciprocity Formulae in Number Theory**, *Brown University*

Fall 2023 **Co-Organizer of "Analytic Number Theory Student Seminar"**, *Stanford University*

Fall 2018 **Co-Organizer of "Seminar on the Trace Formula"**, *McGill University*
Seminar dedicated to study the Arthur-Selberg Trace formula for Postdocs and PhD students

Spring 2018 **Organizer of "Analytic Number Theory Student Seminar"**, *McGill University, Concordia University, University of Montreal*
local graduate student seminar, with bi-weekly talks about various research topics

Fall 2018 **Peer Supporter and Shift Lead**, *McGill Peer Support Centre*
- a peer supporter is a person that provides an emphatic, non-judgmental listening service for students
- a shift lead needs to handle crisis situations (student at imminent risk of harming themselves, ...)
- in total more than 60 hours training required

since 2018 **Reviewer for various mathematical journals**

## Skills

Languages German (mother tongue)| English (fluent) | French (basic) | Italian (basic)

Programming Python (basic)| Mathematica (basic)