Carsten Peterson

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Research Interests

buildings, quantum chaos, symmetric spaces, spectral theory, homogeneous dynamics, representation theory

Education

University of Michigan, Ann Arbor, Michigan
Ph.D. in Mathematics
Advised by Ralf Spatzier
Thesis title: "Quantum Ergodicity on Bruhat-Tits Buildings"
April 2023

Yale University, New Haven, Connecticut
B.A. in Mathematics
May 2017

Budapest Semesters in Mathematics, Budapest, Hungary
Fall 2015 and Spring 2016

Academic Positions

Aalto University, Espoo, Finland
Postdoctoral Researcher in the research group of Tuomas Sahlsten
Summer 2023

Paderborn University, Paderborn, Germany
Postdoctoral Researcher in the Collaborative Research Center between Bielefeld University and Paderborn University on the thematic program Integral Structures in Geometry and Representation Theory (Projects B3 and B4). Member of the Spectral Analysis group of Tobias Weich and the Harmonic Analysis group of Margit Rösler
September 2023 – October 2024

Université Sorbonne Paris Nord, Paris, France
Postdoctoral Researcher funded by the Cofund MathInGreaterParis Fellowship and supervised by Farrell Brumley
October 2024 – September 2025

Preprints

1. *Quantum ergodicity on the Bruhat-Tits building for* $\mathrm{PGL}(3, F)$ *in the Benjamini-Schramm limit* (submitted)

Publications

3. *A geometric perspective on the MSTD question*, with S. J. Miller.
   Discrete and Computational Geometry 62, 832-855 (2019).

2. *The bidirectional ballot polytope*, with S. J. Miller, C. Sprunger, and R. Van Peski.
   Integers 18 (2018), #A81.

1. *Summand minimality and asymptotic convergence of generalized Zeckendorf decompositions*, with K. Cordwell, M. Hlavacek, C. Huynh, S. J. Miller, and Y. N. T. Vu.
   Research in Number Theory (2018) 4: 43.

Awards

Arthur Herbert Copeland, Sr. Memorial Scholarship	Summer 2021
MAA Outstanding Presentation Award	August 2015
John Alan Lewis Summer Research Fellowship	Summer 2015

Research Seminar Talks

- *Quantum ergodicity on the Bruhat-Tits building for PGL(3, F) in the Benjamini-Schramm limit*
  Topology/Geometry Seminar, Universität Göttingen, January 2024 (planned)

- *Quantum ergodicity on the Bruhat-Tits building for PGL(3, F) in the Benjamini-Schramm limit*
  Number Theory Seminar, Johns Hopkins University, December 2023

- *Quantum ergodicity on the Bruhat-Tits building for PGL(3, F) in the Benjamini-Schramm limit*
  Number Theory & Representation Theory Seminar, University of Maryland–College Park, December 2023

- *Brion's formula and its applications to analysis on Bruhat-Tits buildings*
  Groups & Geometry Seminar, Universität Bielefeld, December 2023

- *Quantum ergodicity on the Bruhat-Tits building for PGL(3, F) in the Benjamini-Schramm limit*
  Number Theory Lunch Seminar/Analytic Number Theory & Automorphic Forms Seminar, Max Planck Institute/Universität Bonn, November 2023

- *Quantum ergodicity on the Bruhat-Tits building for PGL(3, F) in the Benjamini-Schramm limit*
  Geometric & Harmonic Analysis Seminar, Universität Paderborn/Aarhus University, October 2023

- *Quantum ergodicity on Bruhat-Tits buildings*
  Mathematical Physics Seminar, Aalto University, August 2023

- *Quantum ergodicity on Bruhat-Tits buildings*
  Number Theory & Representation Theory Seminar, University of Wisconsin–Madison, March 2023

- *Quantum ergodicity on Bruhat-Tits buildings of type $\tilde{A}_2$*
  RTG Geometry, Dynamics and Topology Seminar, University of Michigan, April 2022

Conference Talks/Posters

- *Quantum ergodicity on the Bruhat-Tits building for PGL(3, F) in the Benjamini-Schramm limit*
  Buildings 2023, Justus-Liebig-Universität Gießen, October 2023

- *Quantum ergodicity on the Bruhat-Tits building for PGL(3, F) in the Benjamini-Schramm limit*
  Summer School: Microlocal and Probabilistic Methods in Geometry and Dynamics, Jussieu, France, July 2023 (poster)

- *Quantum ergodicity on Bruhat-Tits buildings of type $\tilde{A}_2$*
  2022 Midwest Representation Theory Conference, University of Michigan, March 2022 (contributed talk)

- *On summand minimality of generalized Zeckendorf decompositions*
  Joint Math Meetings, Atlanta, GA, January 2017 (contributed talk)

- *A geometric perspective on the MSTD question*
  INTEGERS 2016, University of West Georgia, October 2016 (contributed talk)

- *Generalized numerical semigroups of minimal embedding dimension*
  MAA MathFest 2015, Washington, D.C., August 2015 (contributed talk)

- *Some results on two-lifts of graphs*
  Joint Math Meetings 2015, San Antonio, TX, January 2015 (contributed talk)

Learning Seminar Talks

- *The local Weyl law*
  Microlocal Analysis Learning Seminar, Aalto University/University of Helsinki, November 2023

- *L^2-theory and ellipticity*
  Microlocal Analysis Learning Seminar, Aalto University/University of Helsinki, October 2023

- *Analysis on Bruhat-Tits buildings*
  Geometry Seminar, University of Michigan, February 2023

- *Geometry of Bruhat-Tits buildings*
  RTG Geometry, Dynamics and Topology Seminar, University of Michigan, February 2023

- *Quantum ergodicity in the Benjamini-Schramm limit*
  RTG Geometry, Dynamics and Topology Seminar, University of Michigan, February 2023

- *The Harish-Chandra isomorphism and the Satake isomorphism for* $\mathrm{SL}(2)$
  RTG Representation Theory Seminar, University of Michigan, March 2022

- *Applications of* $\mathrm{SL}(2, \mathbb{R})$ *to dynamics*
  RTG Representation Theory Seminar, University of Michigan, December 2021

- *The Fell topology*
  Student Dynamics/Geometry/Topology Seminar, University of Michigan, March 2021

- *Quantum ergodicity on graphs*
  Student Analysis Seminar, University of Michigan, March 2021

- *Some analogies between hyperbolic surfaces and regular graphs*
  Student Dynamics/Geometry/Topology Seminar, University of Michigan, November 2020

- *What is quantum ergodicity?*
  Student Analysis Seminar, University of Michigan, October 2020

- *General relativity for mathematicians*
  Student Geometry/Topology Seminar, University of Michigan, November 2019

- *Coxeter groups and buildings*
  Student Geometry/Topology Seminar, University of Michigan, February 2019

- *Spectral graph theory*
  Student Combinatorics Seminar, University of Michigan, September 2018

- *Introduction to Ehrhart theory*
  Student Combinatorics Seminar, University of Michigan, March 2018

Outreach Talks

- *Quantum ergodicity on manifolds and graphs*
  Physics Graduate Student Symposium, University of Michigan, July 2021

- *Crofton's formula, Buffon's needle, and the isoperimetric inequality*
  Michigan Undergraduate Math Club, University of Michigan, April 2019

- *Exotic number systems*
  Michigan Math Circle, February 2019 (two part talk)

- *Cohn's irreducibility criterion*
  Michigan Undergraduate Math Club, University of Michigan, March 2018

Other Conferences/Workshops Attended

- New Perspectives in the Analytic Theory of Automorphic Forms
  Clay Math Institute, University of Oxford, September 2023

- Durham Symposium 2023: Spectral Gaps
  Durham University, August 2023

- Summer School on High-Dimensional Expanders
  Ghent University, May 2023

- Dynamics, Rigidity and Arithmetic in Hyperbolic Geometry
  ICERM, Brown University, May 2023

- Laplacians on Random Hyperbolic Surfaces and on Random Graphs
  Northwestern University, May 2022

- Spectra and Dynamics on (Locally) Symmetric Spaces
  Universität Paderborn, February 2022

- Microlocal Analysis: Theory and Applications
  University of Montreal, Summer 2021 (MSRI virtual summer school)

- Dynamics and Geometry Online Summer School
  Heilbronn Institute, Bristol University, June 2021 (virtual summer school)

- Midwest Dynamical Systems Conference
  University of Illinois at Chicago, November 2019

- Regional Workshop in Quantitative Geometry & Topology
  The Ohio State University, April 2019

- Graduate Student Topology and Geometry Conference
  University of Illinois at Urbana-Champaign, April 2019

Teaching Experience

Winter 2023	Calculus II	Math 116	Primary Instructor
Fall 2022	Calculus II	Math 116	Primary Instructor
Fall 2021	Calculus III	Math 215	Lab Instructor (MATLAB)
Fall 2020	Calculus II	Math 116	Primary Instructor
Fall 2019	Calculus III	Math 215	Lab Instructor (MATLAB)
Fall 2019	Lie Algebras	Math 612	Grader
Spring 2019	Ordinary Differential Equations	Math 216	Lab Instructor (MATLAB)
Winter 2019	Calculus II	Math 116	Primary Instructor
Fall 2018	Calculus II	Math 116	Primary Instructor
Winter 2018	Calculus I	Math 115	Primary Instructor
Fall 2017	Calculus I	Math 115	Primary Instructor

Outreach & Service

Admissions Committee for Lab of Geometry at Michigan (LoG(M)) Winter 2019 – Fall 2022

- Lab of Geometry at Michigan (LoG(M)) is a Research Experience for Undergraduates for University of Michigan students which takes place during the Fall and Winter semesters. I have served on the admissions committee every term between Winter 2019 and Fall 2022.

Mentor for Directed Reading Program Fall 2019

- The Directed Reading Program pairs graduate students with undergraduates, whom they mentor as they work through more advanced mathematical material. I mentored an undergraduate on a project on differential geometry of curves and surfaces.

Speaker at Michigan Math Circle February 2019

- Michigan Math Circle is an enrichment program for middle and high school students to get exposed to math outside of the K-12 curriculum. I designed and led two 90 minutes sessions on Zeckendorf decompositions and related topics for high school students.

Speaker at Michigan Undergraduate Math Club March 2018, April 2019

- I gave two talks to the University of Michigan undergraduate math club: one on Cohn's irreducibility criterion and the other on integral geometry (Crofton's formula and related topics).

Co-mentor for LoG(M) project Fall 2018

- I co-mentored three undergraduates on a research project related to translation surfaces along with another graduate student (Matt Stevenson) and a faculty member (Alex Wright, who proposed the project).