

# Maximilien Péroux

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## Research interests

Algebraic topology, homotopy theory, algebraic K-theory, higher category theory, theoretical computer science, topological data analysis.

## Academic Appointments

- 2023 – Present **Michigan State University**, East Lansing, MI  
Visiting Assistant Professor (Postdoctoral appointment)  
Postdoctoral mentor: Professor Teena Gerhardt
- 2020 – 2023 **University of Pennsylvania**, Philadelphia, PA  
Hans Rademacher Instructor of Mathematics (Postdoctoral appointment)  
Postdoctoral mentor: Professor Mona Merling.

## Education

- 2015 – 2020 **University of Illinois at Chicago (UIC)** – Chicago, IL  
Doctor of Philosophy (PhD) in Mathematics  
Advisor: Professor Brooke Shipley.
- Fall 2014 **Massachusetts Institute of Technology (MIT)** – Cambridge, MA  
Visiting scholar for Master thesis.
- 2013 – 2015 **École Polytechnique Fédérale de Lausanne (EPFL)** – Lausanne, Switzerland  
Master of Science (MSc) in Fundamental Mathematics  
Advisors: Professors Kathryn Hess & Haynes Miller.
- 2010 – 2013 **École Polytechnique Fédérale de Lausanne (EPFL)** – Lausanne, Switzerland  
Bachelor of Science (BSc) in Mathematics.

## Publications

- 2024 **A monoidal Dold-Kan correspondence for comodules**  
Maximilien Péroux  
*Journal of Pure and Applied Algebra*, vol. 228, no. 8.
- Rigidification of connective comodules**  
Maximilien Péroux  
*To appear in Proceedings of American Mathematical Society*
- 2023 **Spanier-Whitehead duality for topological coHochschild homology**  
Haldun Özgür Bayındır, Maximilien Péroux  
*Journal of London Mathematical Society*, vol. 107, no. 5.

### **Koszul duality in higher topoi**

Jonathan Beardsley, Maximilien Péroux

*Homology, Homotopy and Applications*, vol. 25, no 1.

### **Coinductive control of inductive data types**

Paige Randall North, Maximilien Péroux

*10th Conference on Algebra and Coalgebra in Computer Science (CALCO 2023)*, in *Leibniz International Proceedings in Informatics (LIPIcs)*

2022 **Coalgebras in the Dwyer-Kan localization of a model category**

Maximilien Péroux

*Proceedings of American Mathematical Society*, vol. 150, no. 10.

### **The coalgebraic enrichment of algebras in higher categories**

Maximilien Péroux

*Journal of Pure and Applied Algebra*, vol. 266, no. 3.

2019 **Coalgebras in symmetric monoidal categories of spectra**

Maximilien Péroux, Brooke Shipley

*Homology, Homotopy and Applications*, vol. 21, no. 1.

## Preprints

Submitted **Topological  $\Delta G$ -homology of rings with twisted  $G$ -action**

Gabriel Angelini-Knoll, Mona Merling, Maximilien Péroux [ArXiv:2409.18187](https://arxiv.org/abs/2409.18187)

### **Measuring data types**

Lukas Mulder, Paige Randall North, Maximilien Péroux [ArXiv:2405.14678](https://arxiv.org/abs/2405.14678)

### **Equivariant algebraic $K$ -theory of symmetric monoidal Mackey functors**

Maxine Calle, David Chan, Maximilien Péroux [ArXiv:2312.04705](https://arxiv.org/abs/2312.04705)

### **Trace methods for coHochschild homology**

Sarah Klanderma, Maximilien Péroux [ArXiv:2301.11346](https://arxiv.org/abs/2301.11346)

In preparation **The Eilenberg–Zilber map in higher categories**

Liam Keenan, Maximilien Péroux

### **Coalgebraic $K$ -theories**

Teena Gerhardt, Maximilien Péroux, W. Hermann B. Soré.

### **Algebraic characterization of Thom spectra**

Thomas Brazelton, Maxine Calle, David Chan, Liam Keenan, Maximilien Péroux

### **Persistent free loop spaces**

Jose Perea, Maximilien Péroux, Daniel Tolosa

### **Higher traces for coHochschild homology**

Sanjana Agarwal, David Mehrle, Maximilien Péroux

## Grants & Awards

- 2023 Structured Quartet Research Ensemble — SQuaRE program (American Institute of Mathematics)
- 2021 Simons Travel Grant (American Mathematical Society)
- 2021 Good Teaching Award (University of Pennsylvania)  
*For MATH3700 (Spring 2021) and MATH3710 (Fall 2021 & Fall 2022)*
- 2019 Award for Graduate Research (University of Illinois at Chicago)  
*The award is intended to recognize outstanding researchers among UIC graduate students, to enhance the quality of research, and to assist in the progress toward completion of the degree.*
- 2015 Merit Fellowship (University of Illinois at Chicago)

## Teaching experience

- 2023 – Present **Instructor (Michigan State University)**  
MTH103A: College Algebra I (over 80 undergraduate students), class taught 3 times.  
MTH133: Calculus II (over 20 undergraduate students), class taught 2 times
- 2020 – 2023 **Instructor (University of Pennsylvania)**  
MATH2400: Calculus III (over 150 undergraduate students), class taught 3 times. Calculus coordinator in Spring 2023.  
MATH3120: Linear Algebra for non-math majors (over 80 undergraduate students).  
MATH3700: Abstract Algebra I (over 30 undergraduate students).  
MATH3710: Abstract Algebra II (over 20 undergraduate students), class taught 3 times.  
MATH7300: Topic course in Algebraic Topology (graduate level)
- 2015 – 2020 **Teaching assistant (University of Illinois at Chicago)**  
Supervised discussion sections from two to three classes per semester. Responsible for at least 20 students in each class. Classes: Calculus I, Calculus II and linear algebra.
- 2012 – 2013 **Teaching assistant (École Polytechnique Fédérale de Lausanne)**  
Abstract Algebra and General Topology for undergrads.

## Mentorship experience

- Summer 2024 **Coding Instructor for Teen Engineering Experience at Michigan State (TEEMS)**  
The Detroit Area Pre-College Engineering Program funded TEEMS summer residential outreach program hosted in collaboration with the MSU College of Engineering Multicultural Initiatives program. The program hosted thirty rising 9th-11th graders for a week.
- 2023 – 2024 **Host for a Fulbright Scholar**  
Hosting Professor Hermann Soré from Burkina Faso. This program is intended for university faculty members to go to US to conduct research for collaboration.
- Spring 2022 **Master theses advisor (University of Pennsylvania)**  
-Benjamin Keigwin  
-Marc Muhleisen

- Spring 2019 **Project supervisor (University of Illinois at Chicago)**  
Supervised a semester-long undergrad project on algebraic topology for a visiting student.
- Spring 2018 **Mentor in Math-en-Jean (Lycée Français de Chicago)**  
French initiative aiming to introduce middle and high schoolers, especially girls, to math research. Moderated sessions and served as a mentor to the students.
- Summer 2013 **Member of EMaHP: EPFL Mathematical Humanitarian Project**  
A 2 week long humanitarian trip to South Africa with 22 other EPFL math students. The goal was to introduce and to popularize basic mathematical notions through workshops for South African students from 4 to 18 years old. Video of the journey can be found [here](#).

## Invited talks

- 2024 *Brown University Geometry & Topology Seminar*  
*Indiana University Topology Seminar*  
*University of Kentucky Topology Seminar*  
*Algebraic structures in Topology II – Puerto Rico*  
*University of California - Los Angeles Topology Seminar*  
*Joint Mathematics Meetings – Equivariant techniques in stable homotopy theory*
- 2023 *University of Pennsylvania Topology-Geometry Seminar*  
*Midwest Topology Seminar, UIUC*  
*Cornell University Topology and Geometric Group Theory Seminar*  
*Johns Hopkins Topology Seminar*  
*Joint Mathematics Meetings – Homotopy theory: connections and applications*
- 2022 *University of Minnesota Topology Seminar*  
*Columbia University Topology Seminar*  
*Algebraic structures in Topology – Puerto Rico*  
*Joint Mathematics Meetings – AWM Special Session on Women in Topology*
- 2021 *Cornell University Topology and Geometric Group Theory Seminar*  
*Rutgers University Algebra Seminar*  
*University of Regina Topology Seminar*  
*University of Reno Topology Seminar*  
*Florida State University Homotopy theory Seminar*  
*University of Warwick Algebraic Topology Seminar*
- 2020 *University of Pennsylvania Topology-Geometry seminar*  
*University of Virginia Topology Seminar*  
*Ohio State University Homotopy Theory Seminar*  
*Purdue University Topology Seminar*
- 2019 *Northwestern University Topology Seminar*  
*University of Rochester Topology Seminar*  
*AMS Sectional Meeting: Special Session on Homotopy Theory, University of Wisconsin-Madison*  
*Equivariant Topology & Derived Algebra, NTNU*

*Young topologist meeting, EPFL*  
*LG&TBQ, University of Michigan*  
*Johns Hopkins University Topology Seminar*  
*University of Washington Topology Seminar*

## Professional Activities & Service

- Spring 2023 **Mid-Atlantic Topology Conference**  
Co-organizer
- 2021 – 2023 **UPenn Mathematics Colloquium**  
Co-organizer
- 2020 – Present **Referee for mathematical journals**  
Journal of topology; Journal of pure and applied algebra; Homology, homotopy and applications; Algebraic and geometric topology; Journal of homotopy and related structures; *Discussiones mathematicae*, general algebra and applications.

## Technical skills

### Programming languages

Proficient in: C++, HTML/CSS

Familiar with: Matlab, Python

### Software

LaTeX, Git Word, Excel

### Languages

English (fluent), French (mother tongue), Italian (reading proficient), Spanish (reading proficient)