POLINA BARON

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EDUCATION

Ph.D. University of Chicago, Department of Mathematics (Chicago, IL) 2020 – 2026
M.Sc. Advisor: Simion Filip. M.Sc. obtained in 2022
Thesis: "Semisimplicity and Rigidity of the Kontsevich-Zorich cocycle for products of strata".
Amick Fellowship

M.Sc. **Higher School of Economics,** Department of Mathematics (Moscow, Russia) 2020 – 2022
B.Sc. Thesis: "Ergodic Properties of Linear Involutions". 2016 – 2020
Academic scholarship for excellent students
Graduated Summa Cum Laude ("s otlichiem")

RESEARCH EXPERIENCE

Graduate Research Fellow | University of Chicago (Chicago, IL) 2021 – Present
Research topic: *Algebraic-geometric properties of orbit closures in ergodic dynamical systems.*

Intern | Microsoft Research, ML & AI group (New York, NY) Summer 2024
Project: *Foundations of Convex Optimization*. Supervisors: Miroslav Dudík, PhD; Robert E. Schapire, PhD.

Research Intern | IMSI (Chicago, IL) Summer 2023
Project: *fMRI analysis and simulation for patients with Alzheimer's by methods of dynamical systems, statistical mechanics, and topological data analysis*. Supervisor: Alex Leow, MD, PhD.

Junior Research Assistant | Higher School of Economics (Moscow, Russia) 2018 – 2021
Project: *Dynamics on Surfaces — Foliations and Flows.*
Supported by the joint RFBR (Russia) and CNRS (France) grant #18–51–15010.

PAPERS

Unique ergodicity of flat surfaces under branched n-covers. With E. Shuvaeva. In preparation. (2025)
Semisimplicity and Rigidity of the Kontsevich–Zorich cocycle for products of strata. In preparation. (2025)
The Neumann–Moser dynamical system and the Korteweg–de Vries hierarchy. Arxiv 2402.18079. (2024)
Mumford's dynamical system and Gelfand–Dikii recursion. Funct. Anal. & Its Appl. 57:4. (2023)

SELECTED TALKS

- *Joint Mathematics Meetings.* Washington D.C. (USA). January 4–7, 2026
  - *AWM Special Session on Research Developments by Women in Mathematical Physics*. **Invited speaker.**
  - *AMS Session on Geometric, Dynamical and Probabilistic Aspects of Group Theory*. **Invited speaker.**
  - *AMS Contributed Paper Session on Dynamical Systems and Ergodic Theory*. **Invited speaker.**
- *Tel Aviv University.* Seminar Talk. **Invited speaker.** Tel Aviv-Yafo (Israel). December 28, 2025.
- *Technion (Israel Institute of Technology).* Seminar Talk. **Invited speaker.** Haifa (Israel). December 8, 2025.
- *Stony Brook University.* Seminar Talk. **Invited speaker.** Stony Brook, NY (USA). November 21, 2025.
- *Semi-annual workshop on dynamical systems and related topics*. Pennsylvania State University (USA). November 13–16, 2025.
- *FRG Fall School on Quantization and Lagrangians*. Poster Presentation. UIC (USA). September 6–7, 2025.

- *Beyond Hyperbolicity*. Poster Presentation. ICTP (Italy). June 9–13, 2025.
- *Semi-annual workshop on dynamical systems and related topics.* University of Maryland (USA). April 4–7, 2024.
- *Équations différentielles motiviques et au-delà (online seminar).* **Invited speaker.** Institut Henri Poincaré (France). March 18, 2024.
- *School on flat surfaces and interactions*. University of Bordeaux (France). March 4–8, 2024.

SERVICE

Phoenix STEM Collaborative Learning Coordinator | University of Chicago 2025 – 2026
Dynamics Pre-Seminar Organizer | University of Chicago 2025 – 2026
Organizer of the Warm-Up Program for New Graduate Students | University of Chicago September 2024
Tutorial Coordinator | University of Chicago Math REU June – August 2022

TEACHING AND ADMINISTRATIVE EXPERIENCE

Lecturer (Studies in Mathematics I 112: Introduction to Number Theory) | University of Chicago 2024
Lecturer (Calculus 151-153) | University of Chicago 2023 – 2024
Lecturer (Calculus 131-133) | University of Chicago 2022 – 2023
Senior Mentor | University of Chicago Math REU June – August 2022
Teaching Assistant | University of Chicago 2021 – 2022

RESEARCH INTERESTS

Dynamical systems at the interface of Teichmüller dynamics and integrable systems. I study Hodge-theoretic and measure-rigidity phenomena for $SL_2\mathbb{R}$ actions on orbit closures and products of strata, and unique ergodicity and quantitative behavior on branched covers of translation surfaces. Additional interests include the KdV hierarchy (algebro-geometric solutions and Hamiltonian/Poisson structures) and broader problems in dynamical systems and ergodic theory.

SKILLS, LANGUAGES, AND INTERESTS

Computer & Data Science: convex optimization, statistical machine learning, topological data analysis.
Technical: Python (incl. Matplotlib, Numpy, Scikit-learn, Scipy), SageMath, Wolfram Mathematica, LaTex.
Languages: English (fluent: IELTS 8.0, GRE Writing 4.5), French (technical reading), Russian (native).
Interests: Creative writing (1st place in a contest of speculative fiction short stories in Russian with 500 participants).