

# Ekaterina Shchetka

## Positions

- 2020 – ... **Graduate Student Instructor/Research Assistant**, *University of Michigan*, Department of Mathematics.  
2019 – 2022 **Junior Researcher**, *Steklov Mathematical Institute of the Russian Academy of Sciences*.  
2017 – 2022 **Research Assistant**, *Chebyshev Laboratory*, St. Petersburg State University.

## Education

- 2020 – ... **Ph.D. student**, *University of Michigan*, Department of Mathematics.  
2022 **M.Sc. in Mathematics**, *University of Michigan*.  
2017 **M.Sc. in Mathematical Physics**, *St. Petersburg State University*, graduated with honours.  
2015 **B.Sc. in Physics**, *St. Petersburg State University*, graduated with honours.

## Master's Thesis

- 2017 **Quasiclassical limit and analysis of difference equations**, advisor *Prof. Dr. A. Fedotov*.

## Research Interests

Functional Approach in Hyperbolic Dynamics, Semiclassical Analysis, Spectral Theory of Ergodic and Almost Periodic Schrödinger Operators, Cantor Spectrum of the Almost Mathieu Operator, Complex Analytic Theory of Difference Equations, Anderson Localization, Monodromization Method.

## Teaching

- 2020 – ... **Primary Instructor** (Inquiry-Based Learning Calculus I, Precalculus), *University of Michigan*;  
2018 – 2020 **Grader/TA** (Calculus II, III, Probability I, II), *St. Petersburg State University*;

## Grants, Scholarships, Awards

- 2022 Edwin Wilkinson Miller Prize, *University of Michigan*;  
2021 Math Department Summer Scholarship (graduate student award), *University of Michigan*;  
2020 President Scholarship in priority areas of technological development of Russia;  
2019 Mathematical Progression, "Native Towns" Award for research in mathematics;  
2018 Government Scholarship in priority areas of technological development of Russia;  
2017 The winner of the competition for students and young researchers «Petropolitan Science (Re)Search»;  
• Bocconi Institute of Data Science Award (Milan);  
• Deich scholarship for the best master's thesis at the department of Mathematical Physics;  
2016 Rokhlin Grant for young mathematicians of St. Petersburg;  
• Government Scholarship for high academic achievements;  
• St. Petersburg State University Alumni Association Scholarship;  
2015 The 2nd place winner of the August Möbius Competition (Moscow);  
2013 Government Special Scholarship in the field of mathematics and physics;  
• Zarubina Scholarship for high academic achievements.

## Publications

- 2022 [Difference equations in the complex plane: quasiclassical asymptotics and Berry phase](#) (with A. Fedotov), *Applicable Analysis* (2022), 101:1, 274-296.

- 2020 [The Spectrum and Density of States of the Almost Mathieu Operator with Frequency Represented by a Continued Fraction with Large Elements](#) (with A. Fedotov), *Mathematical Notes* (2020), 107, 1040–1045.
- 2018 [Semiclassical asymptotics of the spectrum of the subcritical Harper operator](#) (with A. Fedotov), *Mathematical Notes* (2018), 104: 6, 948–952.
- [Complex WKB method for a difference Schrödinger equation with the potential being a trigonometric polynomial](#) (with A. Fedotov), *St. Petersburg Math. J.* (2018), 29, 363–381.
  - [Monodromy matrices for Harper equation](#) (with A. Fedotov), *Days on Diffraction. St. Petersburg: IEEE* (2018), 102–106.
- 2017 [The complex WKB method for difference equations in bounded domains](#) (with A. Fedotov), *Journal of Mathematical Sciences (NY)* (2017), 224:1 157–169.
- [Berry phase for difference equations](#) (with A. Fedotov), *Days on Diffraction. St. Petersburg: IEEE* (2017), 113–116.
- 2016 [Complex WKB method for difference equations in unbounded domains](#) (with A. Fedotov), *Days on Diffraction. St. Petersburg: IEEE* (2016), 140–143.

## Conference Talks

- 2021 Workshop “Semiclassical Asymptotics and Nonlocal Elliptic Problems”, RUDN University, online
- 2020 Annual International Conference “Days on Diffraction”, Steklov Math Institute, online
- Conference on Spectral Theory and Mathematical Physics, Sirius Mathematics Center, Sochi
- 2019 St. Petersburg Youth Conference in Probability and Mathematical Physics, Steklov Math Institute
- Conference “Asymptotic Analysis & Spectral Theory”, University Paris-Sud, Orsay
  - School “Randomness in Physics and Mathematics”, ZiF - Center for Interdisciplinary Research, Bielefeld University, Bielefeld
  - 4th Russian-Indian Conference in Statistics and Probability, Euler Math Institute, St. Petersburg
  - Annual International Conference “Days on Diffraction”, Steklov Math Institute, St. Petersburg
  - Conference “Nonlinear dynamics and long-time asymptotics”, Steklov Math Institute, St. Petersburg
  - Conference “Stochastic Models II”, Euler International Math Institute, St. Petersburg
  - School “Spectral Function Theory”, Chebyshev Laboratory, St. Petersburg State University
- 2018 St. Petersburg Youth Conference in Probability and Mathematical Physics, Steklov Institute
- Conférence “Semi-classical and geometric asymptotics in mathematical physics”, Laboratoire CPT, Université de Toulon
  - Annual International Conference “Days on Diffraction”, Steklov Math Institute, St. Petersburg
- 2017 St. Petersburg Youth Conference in Probability and Mathematical Physics, Steklov Institute
- International Student Conference “Science and Progress”, St. Petersburg State University
  - Annual International Conference “Days on Diffraction”, Steklov Math Institute, St. Petersburg
- 2016 Spectral Theory, Differential Equations, and Probability, Johannes Gutenberg Universität, Mainz
- 8th St.Petersburg Conference in Spectral Theory, Euler International Mathematical Institute
  - Annual International Conference “Days on Diffraction”, Steklov Math Institute, St. Petersburg
- 2015 International Student Conference “Science and Progress”, St. Petersburg State University
- August Möbius Competition, Independent University of Moscow

## Seminar Talks

- 2022 Mathematical Physics and Operator Algebras, Michigan State University, East Lansing
- AMS Student Chapter, IUPUI, Indianapolis
- 2019 Department of Mathematical Physics Seminar, St. Petersburg State University
- Dynamical Systems Seminar, Higher School of Economics, Moscow
- 2018 Department of Mathematical Physics Seminar, St. Petersburg State University
- 2017 Chebyshev Lab Student Colloquium, Chebyshev Laboratory, St. Petersburg State University
- 2016 St. Petersburg Seminar on Wave Diffraction and Propagation, Steklov Mathematical Institute

- Department of Math. Physics Seminar, St. Petersburg State University

## Poster talks

2019 Coulomb Gas, Integrability and Painleve's Equations, CIRM, Marceille Luminy

## Minicourses

2023 Koopman, Transfer (Perron-Frobenius) Operators, and Applications ( $5 \times 1.5$  hr), *University of Michigan*;  
 2022 Ruelle Resonances and Trace Formulas in Hyperbolic Dynamics ( $5 \times 1.5$  hr), *University of Michigan*;  
 2018 Intro to Anderson Localization ( $6 \times 2$  hr), *Steklov Mathematical Institute*.

## Research Visits

2020 March 1-24, STEPS Program, *H. Katsura*, Department of Physics, University of Tokyo.

## Research Projects

2019 Analysis, geometry, mathematical physics and its applications (PI A. Baranov), RSF 19-71-30002.  
 2017 – 2021 Developing of asymptotic and spectral investigation methods for periodic and almost periodic differential operators (PI T. Suslina), RSF 17-11-01069.  
 2017 – 2019 Spectral and scattering theory methods in quantum physics and wave propagation theory (PI A. Fedotov), RFBR 17-01-00668;  
 2017 – 2019 Asymptotic and spectral analysis of quantum systems with underlying periodicity (PI A. Fedotov), RFBR 17-51-150008-a;  
 2017 – 2018 Analysis and algebra in applications and interaction (PI S. Smirnov), RSF 14-21-00035.

## Outreach and Service

2024 **mentor**, *Directed Reading Program, Tia Scarsella, presentation chosen for MathClub.*  
 2022 **mentor, facilitator for training week**, *new college instructors.*  
 2021-... **donor**, *STEM magazines (OYLA, Quantik) subscription for Suleya village Library, Russia.*  
 2019-... **co-organizer**, *St. Petersburg Conference "Asymptotic Methods in Mathematical Physics" (2021), Annual International Conference "Days on Diffraction" (2020), Conference "Nonlinear dynamics and long-time asymptotics" (2019).*  
 2011-... **speaker**, *active learning sessions in math and physics for high schoolers and undergrads.*  
 2020 **referee**, *St. Petersburg Mathematical Journal.*

## Mathematical Schools and Programs

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

- Topics in Geometric Flows and Minimal Surfaces, SLMATH (MSRI)
- Partial Hyperbolicity, Brin Mathematics Research Center, University of Maryland
- Big Ideas in Dynamics, online semester-length program, American Institute of Mathematics

 2022 Random Matrix Theory, University of Michigan
 

- Hyperbolic dynamics, University of Houston

 2021 Asymptotic methods and applications, Isaac Newton Institute for Math Sciences, online
 

- Moduli Spaces, Combinatorics, and Integrable Systems, Euler International Math Institute, online
- Spectral Theory and Mathematical Physics, Euler International Mathematical Institute, St. Petersburg
- Random Schrödinger operators arising in the study of random Walks Graduate School, online

 2019 Zimmer's Conjecture (Arbeitsgemeinschaft), MFO, Oberwolfach Research Institute for Mathematics
 

- Lectures on Statistical and Condensed Matter Field Theory, Institut Henri Poincaré, Paris
- Randomness in Physics and Mathematics, ZiF Center for Interdisciplinary Research, Bielefeld University
- Coulomb Gas, Integrability and Painleve's Equations, CIRM, Marceille Luminy

 2018 Rigidity of Stationary Measure (Arbeitsgemeinschaft), MFO, Oberwolfach Research Institute for Mathematics

- Spectral theory of Quasi-Periodic and Random operators, CRM, Université de Montréal
  - Current Topics in Mathematical Physics, The Fields Institute for Research in Mathematical Sciences, Toronto
- 2017 Discrete Models in Geometry and Mathematical Physics, BMS: Technische Universität Berlin
- Advanced Statistics and Probability: Statistical Causal Learning, Lake Como School of Advanced Studies
- 2016 Spectral Theory, Differential Equations, and Probability, Johannes Gutenberg Universität, Mainz
- Various Aspects of Mathematical Physics, Euler International Mathematical Institute, St. Petersburg

## Professional Training

- 2023 UM/AMiBL Workshop, 3 day workshop, *University of Michigan* (UM)
- 2022 Inquiry-Based Learning Workshop, 1 day workshop, UM
- 2021 UM/AMiBL Inquiry-Based Learning Workshop, 3 day intensive workshop, UM
- 2020 Graduate Student Instructor Seminar and Practicum, semester-length course, ELI-UM
- College Teaching in the US: Pedagogy, Culture and Language, 3-week intensive course, ELI-UM

## Languages

Russian (native), English (fluent).