Rostyslav Kozhan

Curriculum Vitae

Department of Mathematics, Uppsala University
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Education and Employment

2019–present	**Assosiate Professor (Lektor)**, Dept of Mathematics. Uppsala University, Uppsala, Sweden
2019	**Docent title**, Mathematics (Analysis and Probability).
2015–2019	**Assistant Professor (Biträdande Lektor)**, Dept of Mathematics. Uppsala University, Uppsala, Sweden
2013–2015	**Post-doctoral Researcher**, Dept of Mathematics. Royal Institute of Technology (KTH), Stockholm, Sweden
2010–2013	**Hedrick Assistant (Adjunct) Professor**, Dept of Mathematics. University of California Los Angeles, California, USA
2006–2010	**Ph.D. (with best dissertation prize)**, Dept of Mathematics. California Institute of Technology, Pasadena, California, USA Ph.D. Thesis: Asymptotics for orthogonal polynomials, exponentially small perturbations and meromorphic continuations of Herglotz functions Advisor: Prof. Barry Simon GPA 4.2/4.0 (note: "A+" = 4.3, "A" = 4.0, "A−" = 3.7)
2005–2006	**Master of Science (with distinction, "red diploma")**, Dept of Mathematics and Statistics. Lviv National University, Lviv, Ukraine Master Thesis: Norm discontinuity and spectrum of the generator of the Banach space valued Ornstein–Uhlenbeck semigroup GPA 5.0/5.0
2001–2005	**Bachelor of Science (with distinction, "red diploma")**, Dept of Mathematics and Statistics. Lviv National University, Lviv, Ukraine GPA 4.95/5.0

Publications

Published

G.Alpan, R.K., *Multiplicative non-Hermitian perturbations of classical β-ensembles*, Random Matrices: Theory and Appl. (2025), accepted pending minor revisions (arXiv:2308.06627).

R.K., M.Vaktnäs, *Szegő recurrence for multiple orthogonal polynomials on the unit circle*, Proc. of Amer. Math. Soc. 152, 7 (2024), pp.2983–2997 (arXiv:2404.18666).

R.K., M.Tyaglov, *A generalized Hermite–Biehler theorem and non-Hermitian perturbations of Jacobi matrices*, J. Math. Anal. Appl. 536, no.2 (2024), Paper No. 128241, 18pp. (arXiv:2302.07018).

G.Alpan, R.K., *Hermitian and non-Hermitian perturbations of chiral Gaussian β-ensembles*, J. Math. Phys. 63, 043505 (2022) (arXiv:2109.13982).

M.Duits, B.Fahs, R.K., *Global Fluctuations for Multiple Orthogonal Polynomial Ensembles*, J. of Functional Analysis 281(5) (2021) (arXiv:1912.04599).

A.I.Aptekarev, R.K., *Differential equations for the recurrence coefficients limits for multiple orthogonal polynomials from a Nevai class*, J. of Approx. Theory 255 (2020), 105409 (arXiv:1908.04540).

R.K., *On Gaussian random matrices coupled to the discrete Laplacian*, "Analysis as a Tool in Mathematical Physics: in Memory of Boris Pavlov" (editors P.Kurasov, A.Laptev, S.Naboko, and B.Simon), Birkhäuser, Operator Theory: Advances and Applications (2020) (arXiv:1801.05749).

M.Duits, R.K., *Relative Szegő asymptotics for Toeplitz determinants*, Int. Math. Res. Notices, 2019(17) (2019), pp. 5441–5496, https://doi.org/10.1093/imrn/rnx266 (arXiv:1611.01020).

R.K., *Rank one non-Hermitian perturbations of Hermitian beta-ensembles of random matrices*, J. of Statistical Phys. 168(1) (2017), pp. 92–108 (arXiv:1510.04456).

R.Killip, R.K., *Matrix models and eigenvalue statistics for truncations of classical ensembles of random unitary matrices*, Comm. Math. Phys. 349(3) (2017), pp. 991–1027 (arXiv:1501.05160).

R.K., *Finite range perturbations of finite gap Jacobi and CMV operators*, Adv. Math. 301 (2016), pp. 204–226 (arXiv:1410.7272).

R.K., *Meromorphic continuations of finite gap Herglotz functions and periodic Jacobi matrices*, Comm. Math. Phys. 327(3) (2014), pp.921–950 (arXiv:1210.4627).

R.K., *Jost asymptotics for matrix orthogonal polynomials on the real line*, Constr. Approx. 36(2) (2012), pp. 267–309 (arXiv:1104.0460).

R.K., *Equivalence classes of block Jacobi matrices*, Proc. Amer. Math. Soc. 139 (2011), pp. 799–805 (arXiv:0911.1586).

R.K., *Szegő asymptotics for matrix-valued measures with countably many bound states*, J. of Approx. Theory, 162(6) (2010), pp. 1211–1224 (arXiv:0910.1975).

R.K., L^1-*spectrum of Banach space valued Ornstein–Uhlenbeck operators*, Semigroup Forum, 78(3) (2009), pp. 547–553 (arXiv:1210.1287).

R.K., *Asymptotics of the eigenvalues of two-diagonal Jacobi matrices*, Mathematical Notes, 77(1–2) (2005), pp. 283–287 (arXiv:1210.1292).

Submitted

R.K., M.Vaktnäs, *Zeros of multiple orthogonal polynomials: location and interlacing*, 19pp. (arXiv:2503.15122).

R.K., *Nikishin systems on the unit circle*, 18pp. (arXiv:2410.20813).

R.K., M.Vaktnäs, *Laurent Multiple Orthogonal Polynomials on the Unit Circle* , 21pp. (arXiv:2410.12094).

R.K., M.Vaktnäs, *Christoffel Transform and Multiple Orthogonal Polynomials*, 28pp. (arXiv:2407.13946).

R.K., M.Vaktnäs, *Determinantal Formulas for Rational Perturbations of Multiple Orthogonality Measures*, 22pp. (arXiv:2407.13961).

In preparation

R.K., M.Vaktnäs, *Generalized Hermite–Padé problem on the unit circle*.

R.Killip, R.K., *Distribution of zeros of random orthogonal polynomials*.

R.K., F.Štampach, *Ratio asymptotics and zero density of orthogonal polynomials with varying Verblunsky coefficients*.

R.K., *Spectral and resonance problem for perturbations of periodic Jacobi operators*, 42pp. (arXiv:1211.4274).

Distinction and Awards

2024 Stiftelsen GS Magnusons Travel **Award**, *23 000 SEK*.

2019 **Vergstiftelsen Award** for hiring a postdoctoral researcher, *1 877 000 SEK*.

2016 TUFF (Teknisk-naturvetenskapliga fakultetens universitetspedagogiska förnyelsefond) **pedagogical development grant**, *94 500 SEK*.

2016 Stiftelsen GS Magnusons Travel **Award**, *11 500 SEK*.

2016 Esseen, L and C-G **Scholarship**, *22 000 SEK*.

2016 SVeFUM Travel **Award**, *8 500 SEK*.

2011–2013 AMS Simons Travel **Grant** for Young Researchers, *4 000 USD*.

2010 **Scott Russell Johnson Best Dissertation Prize**, *Caltech (USA)*.

2009 **Scott Russell Johnson Prize for Excellence in Graduate Research and Teaching**, *Caltech (USA)*.

2007 **Scott Russell Johnson Prize for Excellence in First Year Graduate Research**, *Caltech (USA)*.

2006 **Red Diploma** ("with excellence") in Master's studies, *Lviv University*.

2005 **Red Diploma** ("with excellence") in Bachelor's studies, *Lviv University*.

2005 **Third Prize**, *12-th International Mathematics Competition for University Students, Blagoevgrad, Bulgaria*.

2004 **Second Team Place**, *9-th International Scientific Olympiad in Math, Tehran, Iran*.

2003 Ministry of Education's **recognition list for excellence**, *Ukraine*.

2003 **Second Prize**, *10-th International Mathematics Competition for University Students, Cluj-Napoka, Romania*.

Each of **Numerous Prizes**, *National Mathematics Olympiads for University students, Ukraine*.
2002-2006

2001 **Scholarship** covering tuition and stipend for the full duration of studies, *Lviv National University*.

Each of **Numerous Prizes**, *Mathematics and Physics Olympiads for high school students, regional,*
1997-2001 *national, and international levels*.

Referee for *IMRN*; *Communications in Math. Phys.*; *Memoirs of the AMS*; *J. Spectral Theory*; *Numerical Algorithms*; *J. of Math. Analysis and Applications*; *J. of Computational and Applied Math.*; *Random Matrices: Theory and Appl.*; *Computational and Applied Math.*; *Constructive Approximation*; *Contemporary Math.*; *SIGMA*; *Centr. European J. of Math.*; *Analysis and Mathematical Physics*; *J. of Math. Physics, Analysis and Geometry*.

Supervision

2022–present **PhD project co-supervisor**, *"Spectral analysis of block Toeplitz-like matrices"*, David Meadon, Uppsala University.

2021–present **PhD project supervisor**, *"Recurrence relations and zeros of multiple orthogonal polynomials"*, Marcus Vaktnäs, Uppsala University.

2022 **Bachelor project supervisor**, *"Gap probabilities in random matrix theory"*, Oskar Bäcklin, Uppsala University.

2021 **Master project supervisor**, *"Multiple orthogonal polynomials and modifications of spectral measures"*, Marcus Vaktnäs, Uppsala University.

2021 **Subject reader** for bachelor project, *"Hilbert spaces and the spectral theorem"*, Felicia Lapinski, Uppsala University.

2020–2022 **Postdoc project supervisor**, *"Resonances in random matrix theory"*, Gökalp Alpan, Uppsala University, Vergstiftelsen Grant.

Teaching

Pedagogical training, awards, and activities

2025 **Pedagogical paper** "Cooperative learning through competitive games in Calculus courses", in preparation.

2017 **Pedagogical conference** TUK2017 (Teknisk-naturvetenskapliga fakultetens universitetspedagogiska konferens), *Uppsala University*.
Talk given: "Cooperative Learning in Calculus Courses"

2017 **Pedagogical training** "Supervising Students for Degree Projects"**,** 2 weeks (3 credits), *Uppsala University*.

2016–2017 TUFF (Teknisk-naturvetenskapliga fakultetens universitetspedagogiska förnyelsefond) **pedagogical development grant** (94500 SEK), *Uppsala University*.
Project "Cooperative Learning in Calculus Courses" (1.5 months)

2016 **Pedagogical training** "Supervising PhD Students Course"**,** 3 weeks (4.5 credits), *Uppsala University*.

2016 **Pedagogical training** "Academic Teacher Training Course"**,** 5 weeks (7.5 credits), *Uppsala University*.

2009 Scott Russell Johnson Prize **for Excellence in Teaching and Graduate Research** , *California Institute of Technology*.

Teaching experience

2015–Present Uppsala University, **Instructor** for ODE I; Geometry and Analysis II; Transform methods; Analysis for PhD Students; **Lesson leader** for Multivariable Calculus; Linear Algebra II; Transform Methods; ODE I; Geometry and Analysis II.
$\sim$ 1380 hours total

2010–2013 UCLA, **Instructor** for Real Analysis; Complex Analysis; ODE; PDE; Calculus of Several Variables; Linear Algebra and Applications.
$\sim$ 360 hours total

2006–2010 Caltech, **Assistant** for *Ph.D. Analysis* (a, b, c); *Complex Analysis*; *Real Analysis*; *Probability and Statistics*; *Freshman Calculus*.
$\sim$ 160 hours total

Student Evaluations (Lectures)

Autumn 2024 **4.0/5.0**, joint with another teacher, *Transform Metoder, 1ma034 (Instructor)*, Uppsala, 40 teaching hrs.

Spring 2024 **4.8/5.0**, *Geometri och Analys-II, 1ma188 (Instructor)*, Uppsala, 90 teaching hrs.

Autumn 2023 **3.6/5.0**, joint with another teacher, *Transform Metoder, 1ma034 (Instructor)*, Uppsala, 40 teaching hrs.

Spring 2023 **4.7/5.0**, *Geometri och Analys-II, 1ma188 (Instructor)*, Uppsala, 90 teaching hrs.

Spring 2022 **4.6/5.0**, *Geometri och Analys-II, 1ma188 (Instructor)*, Uppsala, 90 teaching hrs.

Spring 2021 **4.5/5.0**, *Geometri och Analys-II, 1ma188 (Instructor)*, Uppsala, 90 teaching hrs.

Spring 2020 **4.7/5.0**, *Geometri och Analys-II, 1ma188 (Instructor)*, Uppsala, 90 teaching hrs.

Autumn 2019 **4.0/5.0**, joint with another teacher, *Transform Metoder, 1ma034 (Instructor)*, Uppsala, 40 teaching hrs.

Autumn 2018 **4.3/5.0**, *Ordinära Differentialekvationer I, 1ma032 (Instructor)*, Uppsala, 50 teaching hrs.

Autumn 2017	**4.7/5.0**, *Ordinära Differentialekvationer I, 1ma032 (Instructor)*, Uppsala, 50 teaching hrs.
Spring 2017	**4.6/5.0**, *Geometri och Analys-II, 1ma188 (Instructor)*, Uppsala, 90 teaching hrs.
Autumn 2016	**4.7/5.0**, *Ordinära Differentialekvationer I, 1ma032 (Instructor)*, Uppsala, 50 teaching hrs.
Spring 2016	**5.0/5.0**, *Geometri och Analys-II, 1ma188 (Instructor)*, Uppsala, 90 teaching hrs.
Autumn 2015	**4.8/5.0**, *Ordinära Differentialekvationer I, 1ma032 (Instructor)*, Uppsala, 50 teaching hrs.
Spring 2013	**8.18/9.0**, *Calculus of Several Variables, math32a (Instructor)*, UCLA, 30 teaching hrs.
Spring 2013	**7.75/9.0**, *Partial Differential Equations, math136 (Instructor)*, UCLA, 30 teaching hrs.
Winter 2013	**8.05/9.0**, *Calculus of Several Variables, math32a (Instructor)*, UCLA, 30 teaching hrs.
Fall 2012	**7.58/9.0**, *Calculus of Several Variables, math32a (Instructor)*, UCLA, 30 teaching hrs.
Spring 2012	**8.0/9.0**, *Complex Analysis, math132 (Instructor)*, UCLA, 30 teaching hrs.
Winter 2012	**7.42/9.0**, *Calculus of Several Variables, math32a (Instructor)*, UCLA, 30 teaching hrs.
Fall 2011	**7.49/9.0**, *Calculus of Several Variables, math32a (Instructor)*, UCLA, 30 teaching hrs.
Fall 2011	**7.06/9.0**, *Real Analysis, math131 (Instructor)*, UCLA, 30 teaching hrs.
Spring 2011	**7.52/9.0**, *Ordinary Differential Equations, math135 (Instructor)*, UCLA, 30 teaching hrs.
Spring 2011	**7.08/9.0**, *Partial Differential Equations, math136 (Instructor)*, UCLA, 30 teaching hrs.
Winter 2011	**5.90/9.0**, *Linear Algebra and Applications, math33a (Instructor)*, UCLA, 30 teaching hrs.
Fall 2010	**5.84/9.0**, *Real Analysis, math131 (Instructor)*, UCLA, 30 teaching hrs.

Conference and seminar talks

2024 Workshop "UK-PL-UA Workshop on Random Matrix Theory and Group Actions and Representations", Warsaw, Poland.
Talk: " Radial distribution of eigenvalues of rank one truncations of circular β-ensembles"

2024 17-th International Symposium on Orthogonal Polynomials, Special Functions and Applications, Granada, Spain.
Talk: "Zeros of orthogonal and paraorthogonal polynomials via CMV matrices"

2024 Applied Analysis Seminar, Universidad Carlos III de Madrid, Spain.
Talk: "Christoffel/Geronimus transforms and multiple orthogonal polynomials"

2023 Workshop "Integrable Systems, Random Matrices, and Special Functions", UBI, Covilhã, Portugal.
Talk: "Christoffel transform and multiple orthogonal polynomials"

2023 Marcus Wallenberg Symposium "Analysis and Mathematical Physics AMP2023", Stockholm, Sweden.
Talk: "Multiple orthogonal polynomials on the unit circle"

2022 16-th International Symposium on Orthogonal Polynomials, Special Functions and Applications, Montréal, Canada.
Talk: "Global fluctuations for multiple orthogonal polynomial ensembles"

2022 Bielefeld–Melbourne joint Random Matrix Seminar, Bielefeld, Germany.
Talk: "Rank one perturbations of classical β-ensembles"

2021 Conference "Complex Approximations, Orthogonal Polynomials and Applications", Sochi.
Talk: "Differential equations for the limit of the nearest-neighbour recursion coefficients"

2019 PDE and Applications Seminar, Uppsala University, Sweden.
Talk: "Central Limit Theorem for linear statistics for orthogonal polynomial ensembles on the unit circle"

2019 Docent Presentation, Uppsala University, Sweden.
Talk: "Orthogonal polynomials and their applications in Random Matrix Theory"

2018 Analysis Seminar, Lund University, Sweden.
Talk: "Relative Strong Szegő Theorem"

2017 Analysis Seminar, Stockholm University, Sweden.
Talk: "Relative Strong Szegő Theorem"

2017 Random Matrix Theory Seminar, KTH, Sweden.
Talk: "Jacobi and CMV models for classical random matrix ensembles and their rank one perturbations"

2017 The International Conference in Functional Analysis dedicated to the 125-th anniversary of Stefan Banach, Lviv, Ukraine.
Talk: "Finite rank perturbations of finite gap Jacobi and CMV operators"

2017 14-th International Symposium on Orthogonal Polynomials, Special Functions and Applications, Canterbury, UK.
Talk: "Relative strong Szegő theorem"

2016 Conference on Methods of Modern Mathematical Physics, Toronto, Canada.
Talk: "Rank-one Additive and Multiplicative non-Hermitian Perturbations of Hermitian Matrices"

2016 12-th International Conference on Approximation and Optimization in the Carribean (APPOPT 2016), Havana, Cuba.
Talk: "Multiplicative non-Hermitian perturbations of Jacobi matrices and classical random matrix ensembles"

2016 Analysis and Probability Seminar, Uppsala University, Sweden.
Talk: "Multiplicative non-Hermitian perturbations of Jacobi matrices and classical random matrix ensembles"

2016 27-th Nordic Congress of Mathematicians, Stockholm, Sweden.
Talk: "Multiplicative non-Hermitian perturbations of Jacobi matrices"

2015 XI Brunel–Bielefeld Workshop on Random Matrix Theory, Bielefeld, Germany.
Talk: "Eigenvalue statistics for rank one perturbations of unitary and Hermitian β-ensembles"

2015 Analysis Seminar, Shanghai Jiao Tong University, Shanghai, China.
Talk: "Resonances in Spectral Theory and Random Matrix Theory via Orthogonal Polynomials"

2015 Analysis Seminar, California State University, Los Angeles, CA.
Talk: "Interplay between spectral theory, random matrix theory, and scattering theory"

2015 Research Workshop "Random matrices and their applications", Hong Kong.
Talk: "Eigenvalues of rank one perturbations of β-ensembles"

2015 Analysis Seminar, University of Macau, Macau.
Talk: "Rank one perturbations of classical random matrix ensembles"

2014 Research Workshop "Non-Hermitean Random Matrices: 50 Years After Ginibre", Yad Hashmona, Israel.
Talk: "Rank one perturbations of Hermitean and unitary β-ensembles"

2014 Analysis Seminar, Stockholm University.
Talk: "Inverse resonance problem for perturbations of Jacobi operators"

2014 Workshop "Random Matrices and Jacobi Operators", Mittag-Leffler Institute, Stockholm.
Talk: "Eigenvalues of rank one perturbations of random matrices"

2014 London Analysis and Probability Seminar, Imperial College London, UK.
Talk: "Resonances associated with random matrices"

2014 Stochastic Integrable Systems Seminar, Warwick University, UK.
Talk: "Resonances associated with random matrices"

2014 Mathematical Physics Seminar, Bristol University, UK.
Talk: "Rank one perturbations of random matrices, zeros of orthogonal polynomials, and scattering resonances of open systems"

2014 International symposium OrthoQuad, Tenerife, Spain.
Talk: "Inverse resonance problem for perturbations of periodic Jacobi matrices: existence, uniqueness, stability"

2013 Swiss Probability Seminar, Bern, Switzerland.
Talk: "Resonances of random matrices and zeros of orthogonal polynomials"

2013 Analysis and Dynamical Systems Seminar, KTH, Stockholm.
Talk: "Random unitary and subunitary matrices via orthogonal polynomials and CMV matrices"

2013 7-th International Conference "Computational Methods and Function Theory", Shantou, China (supported by NSF travel award).
Talk: "Zeros of orthogonal polynomials and truncations of unitary random matrices"

2013 18-th Conference of the International Linear Algebra Society, Providence, RI.
Talk: "Spectral theory of exponentially decaying perturbations of periodic Jacobi matrices"

2013 Workshop on Dynamical Methods in Spectral Theory of Quasicrystals, UCI, Irvine, CA, USA.
Talk: "Inverse resonance problem for perturbations of periodic Jacobi matrices: existence, uniqueness, and stability"

2013 Colloquium, Kent State University, Kent, OH, USA.
Talk: "Unitary random matrices via orthogonal polynomials"

2013 31-st Western States Mathematical Physics Meeting, Pasadena, CA.
Talk: "Direct and inverse resonance problem for perturbations of periodic Jacobi matrices"

2013 Mathematical Physics Seminar, UCI, Irvine, CA.
Talk: "Universality for subunitary random matrices and random orthogonal polynomials"

2013 Mathematical Physics Seminar, Caltech, Pasadena, CA.
Talk: "Direct and inverse resonance problem for perturbations of periodic Jacobi matrices"

2012 Analysis Seminar, UCLA.
Talk: "Truncations of random unitary ensembles"

2012 XVII International Congress on Mathematical Physics, Aalborg, Denmark (supported by NSF travel award).
Talk: "Eigenvalues of random CMV matrices"

2012 International Symposium on Orthogonal Polynomials and Special Functions – a Complex Analytic Perspective, Copenhagen, Denmark.
Talk: "Zeros of random orthogonal polynomials on the unit circle"

2012 Mathematical Physics Seminar, Caltech, Pasadena, CA.
Talk: "Zeros of random orthogonal polynomials"

2012 AMS Southeastern Sectional Meeting, USF, Tampa, FL.
Talk: "Zeros of random orthogonal polynomials"

2012 Analysis Seminar, UCLA, Los Angeles.
Talk: "Zeros of random orthogonal polynomials"

2010 Arizona School of Analysis with Applications, University of Arizona.
Talk: "Meromorphic continuations of finite gap Herglotz functions"

2010 28-th Western States Mathematical Physics Meeting, Pasadena, CA.
Talk: "Meromorphic continuations of finite gap Herglotz functions"

2010 Analysis Seminar, UCLA, Los Angeles.
Talk: "Meromorphic continuations of finite gap Herglotz functions"

2009 XVI International Congress on Mathematical Physics, Prague, Czech Republic (supported by NSF travel award).

2009 10-th International Symposium on Orthogonal Polynomials, Special Functions and Applications, Leuven, Belgium.
Talk: "Szegő asymptotics for matrix-valued measures with countably many bound states"

2009 Mathematical Physics Seminar, Caltech, Pasadena, CA.
Talk: "Szegő asymptotics for matrix-valued measures with countably many bound states"

2006 IV-th Summer School "Algebra, Topology, Functional and Stochastic Analysis", Kozyova, Ukraine.
Talk: "L^1-spectrum of Banach space valued Ornstein–Uhlenbeck operators"

2004 Ja.S. Pidstryhach Conference on the Modern Problems of Mechanics and Mathematics, Lviv, Ukraine.
Talk: "Asymptotics of the eigenvalues of two-diagonal Jacobi matrices"