Mihajlo Cekić

Personal Information

Date of Birth: 14 September, 1991
Address: Office K04
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Research Interests

Geometric inverse problems. Dynamical systems. Calderón inverse problem. X-ray transforms. Inverse spectral problems. Hyperbolic (Anosov) and partially hyperbolic flows. Speed of mixing. Pollicott-Ruelle resonances. Ruelle zeta functions. Eigenfunction concentration. Teichmüller dynamics.

Employment

University of Zurich **10.2021 - now**
Ambizione Grantee
- Project number 201806 of the Swiss National Science Foundation (539,933 CHF)

University of Zurich **9.2021 - 10.2021**
Postdoctoral researcher
- Advisor: Artur Avila

CNRS, Université Paris-Saclay (Orsay) **9.2019 - 8.2021**
Postdoctoral researcher
- Advisor: Colin Guillarmou

Max Planck Institute for Mathematics, Bonn **10.2017 - 8.2019**
Postdoctoral fellowship
- Advisors: Werner Ballmann and Herbert Koch

Education

University of Cambridge (Trinity College)

Ph.D., Mathematics **10.2014 - 9.2017**
- Thesis title: "The Calderón problem for connections"
- Advisor: Gabriel P. Paternain

Master of Mathematics **10.2013 - 6.2014**
- Graduated with Distinction
- Wrote an essay "Statistical Properties of Geometric Flows and Equidistribution"

Bachelor of Arts in Mathematics **10.2010 - 6.2013**
- Graduated with First Class Honours from all three years

Internship

University of Cambridge **6.2013 - 8.2013**
Summer undergraduate research project
- Title: "Λ^r Khovanov homology of rational knots"
- Advisor: Jacob Rasmussen

Research Funding

Ambizione Grant: Dynamics, Rigidity, and Inverse Problems **10.2021 - now**
Principal Investigator (539,933 CHF)
- Project number 201806 of the Swiss National Science Foundation

PNRR project: Conformal Geometry and Dynamics **1.2024 - now**
Member (1M EUR)
- Grant of the Romanian Academy of Sciences

Swissmap grant **28.5-2.6.2023**
Main organizer (30,000 CHF)
- Grant for the workshop "Analytic Techniques in Dynamics and Geometry"

Teaching Experience

Research Supervision **9.2024 -**
- Co-advisor (on distance) of a PhD student in LUT, Finland

University of Zurich **9.2022 - now**
- Designed and taught a Masters course on: "Microlocal Methods in Dynamical Systems" (Autumn 2022).
- Masters student seminar on the Calderón problem (Autumn 2024).

University of Bonn **10.2018 - 6.2019**
- Designed and taught a Masters course on: "Introduction to Microlocal Analysis with applications" (Winter 2018/19).
- Organised a Masters seminar on the Steklov spectrum with A. Siffert (Summer 2019).

Trinity College, University of Cambridge **10.2014 - 6.2017**
Supervisor, Mathematical Tripos

Supervised the following subjects (semester in brackets):
- Year III: Differential Geometry (Lent 2015, Michaelmas 2016, Easter 2017), Riemann Surfaces (Easter 2016, Lent 2017), Linear Analysis (Easter 2016 and 2017)
- Year II: Linear Algebra (Michaelmas 2015), Analysis II (Michaelmas 2014), Metric and Topological Spaces (Michaelmas 2014)
- Year I: Analysis I (Lent 2015), Pure revision (Easter 2015).

Petnica Science Centre, Serbia **10.2010 - 8.2020**
Senior Associate, Mathematics Seminar

Gave lecture series and designed summer projects. Mentored talented high school students.

Mathematical Grammar School, Serbia **12.2012 - 12.2014**
Teaching Assistant

Prepared high school students for mathematical competitions.

Honours / Awards

- Third award for the Smith-Rayleigh and Knight-Rayleigh Prize essay, under the title "The Calderón problem for connections" — 1.2016
- Trinity College Internal Graduate Scholarship (Ph.D. full funding) — 10.2014 - 9.2017
- Senior Scholar, Trinity College — 10.2013
- Trinity College Overseas Bursary (funding for undergraduate studies) — 10.2010 - 6.2014
- Bridgewater summer research scholarship — 6-8.2013
- International Mathematical Olympiad – two silver medals — 7.2009, 7.2010
- Balkan Mathematical Olympiad – silver and bronze medal — 5.2009, 5.2010
- Winner of the "Mathematical All-Around" in competition of over 200 competitors, held in Kolmogorov High School, Moscow, Russia — 11.2009
- Junior Balkan Mathematical Olympiad – bronze medal — 5.2006

Organisation

- With C. Ulcigrai: Workshop on Rigidity Phenomena in Dynamics and Spectral Theory, Zurich — 9-13.9.2024
- With A. Avila, and T. Lefeuvre: Workshop on Analytic Techniques in Dynamics and Geometry, Les Diablerets, Swiss Alps — 28.5-2.6.2023
- With O. Ivanovici, T. Lefeuvre, and F. Naud: Summer School on Microlocal and Probabilistic Methods in Dynamics and Geometry, Paris — 3-7.7.2023

Peer Review

International Mathematical Research Notices, Pure and Applied Analysis, SIAM Journal of Mathematical Analysis, Communications in Partial Differential Equations, Nonlinearity, Communications in Mathematical Physics, Forum Mathematicum, Journal of the European Mathematical Society, Journal of Spectral Theory, Journal of Mathematical Physics, Nat. Sci. and Eng. Research Council of Canada, Journal of Topology, Journal of Differential Geometry

Publications

1. M. Cekić, *Calderón problem for connections*, Comm. Partial Differential Equations **42** (2017), no. 11, 1781–1836.
2. M. Cekić, *Calderón problem for Yang-Mills connections*, J. Spectr. Theory **10** (2020),

463–513.
3. M. Cekić, Y.-H. Lin, A. Rüland, *The Calderón problem for the fractional Schrödinger equation with drift*, Calc. Var. Partial Differential Equations **59** (2020), no. 3, Paper No. 91, 46 pp.
4. M. Cekić, B. Georgiev, M. Mukherjee, *Polyhedral billiards, eigenfunction concentration and almost periodic control*, Commun. Math. Phys. **377** (2020), 2451–2487.
5. M. Cekić, G.P. Paternain, *Resonant spaces for volume preserving Anosov flows*, Pure and Applied Analysis **2**-4 (2020), 795–840.
6. M. Cekić, T. Lefeuvre, *Generic dynamical properties of connections on vector bundles*, Int. Math. Res. Not. IMRN 2022, no. 14, 10649–10703.
7. M. Cekić, C. Guillarmou, *First band of Ruelle resonances for contact Anosov flows in dimension 3*, Commun. Math. Phys. **386** (2021), no. 2, 1289–1318.
8. M. Cekić, S. Dyatlov, B. Delarue, G. P. Paternain, *The Ruelle zeta function at zero for nearly hyperbolic 3-manifolds*, Inventiones Mathematicae **229** (2022), 303–394.
9. M. Cekić, T. Lefeuvre, A. Moroianu, U. Semmelmann, *Towards Brin's conjecture on frame flow ergodicity: new progress and perspectives*, Mathematics Research Reports **3** (2022), 21–34.
10. M. Cekić, T. Lefeuvre, *Holonomy Inverse Problem*, accepted in Journal of European Mathematical Society (2022), arXiv:2105.06376.
11. M. Cekić, C. Guillarmou, T. Lefeuvre, *Local Lens Rigidity for manifolds of Anosov type*, accepted in Analysis and PDE (2023), arXiv:2204.02476.
12. M. Cekić, T. Lefeuvre, A. Moroianu, U. Semmelmann, *On the ergodicity of unitary frame flows on Kähler manifolds*, accepted in Ergodic Theory and Dynamical Systems (2023), arXiv:2301.05933.
13. M. Cekić, T. Lefeuvre, *Isospectral connections, ergodicity of frame flows, and polynomial maps between spheres*, accepted in Annales scientifiques de l'École normale supérieure (2023), arXiv:2209.11109.
14. M. Cekić, T. Lefeuvre, *Generic injectivity of the X-ray transform*, accepted in Journal of Differential Geometry (2024), arXiv:2107.05119.
15. M. Cekić, T. Lefeuvre, *Stability estimates for the Holonomy Inverse Problem*, accepted in Communications in Partial Differential Equations (2024), arXiv:2303.11998.

Preprints

16. M. Cekić, T. Lefeuvre, A. Moroianu, U. Semmelmann, *On the ergodicity of the frame flow on even-dimensional manifolds*, arXiv preprint (2021), arXiv:2111.14811.
17. M. Cekić, G.P. Paternain, *Resonant forms at zero for dissipative Anosov flows*, arXiv preprint (2022), arXiv:2211.06255.
18. M. Cekić, T. Lefeuvre, A. Moroianu, U. Semmelmann, *Correspondence between Pestov and Weitzenböck identities*, arXiv preprint (2023), arXiv:2305.01092.
19. M. Cekić, *Calderón problem for systems via complex ray transform*, arXiv preprint (2023), arXiv:2309.09348.
20. M. Cekić, T. Lefeuvre, *Semiclassical Analysis on Principal Bundles: Theory and Applications* (Monograph), arXiv preprint (2024), arXiv:2405.14846.

In preparation

21. A. Avila, M. Cekić, D. Galli, *Precise counting of closed orbits of Techmüller geodesic flow.*
22. M. Cekić, G. P. Paternain, *Quasi-Fuchsian flows and coupled vortex equations.*
23. M. Cekić, A. Siffert, *Inverse magnetic Steklov problems on surfaces.*
24. M. Cekić, F. Torres de Lizaur, *On Anosov flows with zero helicity.*

Unpublished Texts

M. Cekić, *Harmonic determinants and unique continuation*, arXiv preprint (2018), arXiv:1803.09182.

Lecture Notes

M. Cekić, *Introduction to Microlocal Analysis and Applications*, available online.
M. Cekić, *Microlocal Methods in Dynamical Systems*, available online.

Upcoming talks

- Summer School: Geometric Inverse Problems and Inverse Problems for Elliptic Equations, Santa Cruz — 19-22 August, 2024

Talks

- Microlocal Analysis seminar (online), Fudan University — 2 May, 2024
- Inverse Problems Zoom Seminar, University of Helsinki — 28 September, 2023

- Two talks at Applied Inverse Problems, Göttingen — 4-8 September, 2023
- Graduate Colloquium, Zurich — 29 November, 2022
- Geometry Seminar, ETH — 23 November, 2022
- Workshop: Geometric Inverse Problems, Linz — 7-11 November, 2022
- Geometry and Topology Seminar, Jussieu, Paris — 6 October, 2022
- Section talk at DMV Annual Meeting, Berlin — 12-16 September, 2022
- Seminar talk at Nicolaius Copernicus University, Toruń — 31 May, 2022
- Colloquium talk at Kuwait University — 6 April, 2022
- Geometric Inverse Problems and Dynamical Systems, Roscoff — 7-11 March, 2022
- Leeds Geometry Seminar — 2 February, 2022
- Geometric Analysis Seminar, Indian Institute of Technology, Bombay — 27 January, 2022
- Minisymposium on Inverse Problems (RSME), Ciudad Real — 17-21 January, 2022
- Seminar on PDEs and Mathematical Physics, Zurich — 28 October, 2021
- Ergodic Theory and Dynamical Systems Seminar, Zurich — 22 November, 2021
- Special Semester on Tomography Across the Scales: a Prequel, Linz — 11 October, 2021
- International Inverse Problems Seminar — 23 September, 2021
- Workshop: Ruelle-Pollicott Resonances in Dynamics and in Semi-classical Analysis, Lausanne (online) — 5 March, 2021
- Séminaire: Problèmes Spectraux en Physique Mathématique (online) — 1 February, 2021
- Paderborn geometric analysis seminar — 8 December, 2020
- Heidelberg Analysis Seminar — 19 November, 2020
- Advanced Topics in PDE seminar, Bonn — 13 November, 2020
- Séminaire ANH, Orsay — 20 January, 2020
- Seminar semiklassische Analysis und Darstellungstheorie, Köln — 3 December, 2019
- Oberseminar differentialgeometrie, MPIM, Bonn — 21 November, 2019
- MSRI seminar, Berkeley, USA — 29 October, 2019
- Workshop on Symplectic Topology, Belgrade, Serbia — 20 August, 2019
- Workshop: Probing the Earth and the Universe with Microlocal Analysis, Banff, Canada — 18 April, 2019
- Dynamics, geometry and interactions seminar, MPIM, Bonn — 2 April, 2019
- 10th Itinerant Workshop in PDE's, INδAM, Rome Sapienza — 31 January, 2019
- Symplectic Topology Seminar, Mathematical Faculty, Serbia — 28 December, 2018
- Second Annual Meeting, SANU, Serbia — 25 December, 2018
- Dynamics, geometry and interactions seminar, MPIM, Bonn — 6 November, 2018
- Conference: Inverse and Spectral Problems for (Non)-Local Operators, Leipzig, Germany — 10 September, 2018
- Summer school: Inverse problems and Unique continuation, Kopp — 4 September, 2018
- Workshop: Inverse problems, PDE and geometry, Jyväskylä, Finland — 20 August, 2018
- Oberseminar Differentialgeometrie, MPIM Bonn — 28 June, 2018
- Workshop: Analytic study of flows, Peyresq, France — 5 June, 2018
- Analysis and PDE seminar, UC Berkeley, USA — 19 March, 2018
- Geometry and analysis seminar, UC Santa Cruz, USA — 16 March, 2018
- Program for Inverse Problems, Imaging and PDEs, HKUST Institute for Advanced Study, Hong Kong — 29 November, 2017
- Geometric Analysis learning seminar: Ergodicity of the geodesic flow in negative curvature, MPIM, Bonn — 14, 21 November, 2017
- MPI-Oberseminar, MPIM, Bonn — 2 November, 2017
- Graduate Seminar on Advanced Topics in PDE, University of Bonn — 20 October, 2017
- Conference: Mathematical Methods in Inverse Scattering and Spectral Theory, University of Leeds — 15 September, 2017
- Differential Geometry and Topology seminar, University of Cambridge — 10 May, 2017
- Conference: 100 Years of the Radon Transform, Linz — 30 March, 2017
- Inverse Problems seminar, University College London — 24 March, 2017
- LMS Workshop on Geometric Inverse Problems, Manchester (poster presentation) — 28 February, 2017
- Junior Geometry Seminar, University of Cambridge — 27 January, 2017
- Inverse Problems and Imaging seminar, University of Manchester — 1 December, 2016
- Junior Geometry Seminar, University of Cambridge — March 2016
- Mathematical Institute SANU, Serbia — September 2015
- Junior Geometry Seminar, University of Cambridge — March 2015
- Mathematical Institute SANU, Serbia — December 2014

	• Mathematical Institute SANU, Serbia	December 2013
Outreach	• Panelist in the Forum of the Zurich Graduate School of Mathematics (topic "Becoming an independent researcher")	27 September, 2023
Visits / Conferences attended	• Meeting of the ANR ADYCT, Grenoble	27-28 March, 2023
	• Microlocal Analysis Program, MSRI, USA	9-11.2019
	• International Congress of Mathematicians, Rio de Janeiro	8.2018
	• Workshop on Groups, Geometry and Dynamics, Montevideo	7.2018
	• Visit to UC Berkeley analysis group	3.2018
	• Visiting Professor Uhlmann at the Program for Inverse Problems, Imaging and PDEs, Institute for Advanced Study, Hong Kong	12.2017
	• Summer School in Microlocal Analysis, Cardiff, UK	6.2017
	• Geometric Inverse Problems Semester, Paris, France	6.2015
	• Applied Inverse Problems, Helsinki, Finland	5.2015
Other	Languages: Serbian (native), English (fluent), German, Russian (intermediate), French (basic). Interests: sports (football, skiing, tennis, running), reading.	