

# Semyon Dyatlov

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## Research interests

Quantum chaos, microlocal analysis, dynamical systems, scattering theory, and general relativity.

## Employment

- 2024– Professor, Massachusetts Institute of Technology
- 2019–2024 Associate Professor With Tenure, Massachusetts Institute of Technology
- 2018–2020 Assistant Professor, University of California, Berkeley
- 2018–2019 Associate Professor Without Tenure, Massachusetts Institute of Technology
- 2015–2018 Assistant Professor, Massachusetts Institute of Technology
- 2013–2018 Research Fellow, Clay Mathematics Institute
- Fall 2013 Postdoctoral Fellow in Mathematical General Relativity, MSRI
- 2009–2013 Graduate Student Researcher/Instructor, University of California, Berkeley

## Education

- 2008–2013 Ph.D. Mathematics, University of California, Berkeley  
Dissertation title: *Resonances in general relativity*  
Dissertation advisor: Maciej Zworski
- 2003–2008 B.S. Mathematics, Novosibirsk State University (Russia)

## Research papers

- [40] *Semiclassical measures for complex hyperbolic quotients*, with Jayadev Athreya and Nicholas Miller; [arXiv:2402.06477](https://arxiv.org/abs/2402.06477).
- [39] *Mathematics of internal waves in a 2D aquarium*, with Jian Wang and Maciej Zworski, *Analysis & PDE* **18**(2025), 1–92; [arXiv:2112.10191](https://arxiv.org/abs/2112.10191).
- [38] *Semiclassical measures for higher dimensional quantum cat maps*, with Malo Jézéquel, *Annales Henri Poincaré*, **25**(2024), 1545–1605; [arXiv:2108.10463](https://arxiv.org/abs/2108.10463).
- [37] *Pollicott–Ruelle resolvent and Sobolev regularity*, *Pure and Applied Functional Analysis* **8**(2023), 187–213; [arXiv:2108.06611](https://arxiv.org/abs/2108.06611).
- [36] *Ruelle zeta function at zero for nearly hyperbolic 3-manifolds*, with Mihajlo Cekić, Benjamin Delarue, and Gabriel Paternain, *Inventiones Mathematicae* **229**(2022), 303–394; [arXiv:2009.08558](https://arxiv.org/abs/2009.08558).
- [35] *Control of eigenfunctions on surfaces of variable curvature*, with Long Jin and Stéphane Nonnenmacher, *Journal of the American Mathematical Society* **35**(2022), 361–465; [arXiv:1906.08923](https://arxiv.org/abs/1906.08923).
- [34] *Microlocal analysis of forced waves*, with Maciej Zworski, *Pure and Applied Analysis* **1**(2019), 359–384; [arXiv:1806.00809](https://arxiv.org/abs/1806.00809).
- [33] *Fractal uncertainty for transfer operators*, with Maciej Zworski, *International Mathematics Research Notices*, 2020, 781–812; [arXiv:1710.05430](https://arxiv.org/abs/1710.05430).

- [32] *Semiclassical measures on hyperbolic surfaces have full support*, with Long Jin, *Acta Mathematica* **220**(2018), 297–339; [arXiv:1705.05019](#).
- [31] *Fourier dimension and spectral gaps for hyperbolic surfaces*, with Jean Bourgain, *Geometric and Functional Analysis* **27**(2017), 744–771; [arXiv:1704.02909](#).
- [30] *Fractal Weyl laws and wave decay for general trapping*, with Jeffrey Galkowski, *Nonlinearity* **30**(2017), 4301–4343; [arXiv:1703.06515](#).
- [29] *Dolgopyat’s method and the fractal uncertainty principle*, with Long Jin, *Analysis & PDE* **11**(2018), 1457–1485; [arXiv:1702.03619](#).
- [28] *Spectral gaps without the pressure condition*, with Jean Bourgain, *Annals of Mathematics(2)* **187**(2018), 825–867; [arXiv:1612.09040](#).
- [27] *Resonances for open quantum maps and a fractal uncertainty principle*, with Long Jin, *Communications in Mathematical Physics* **354**(2017), 269–316; [arXiv:1608.02238](#).
- [26] *Ruelle zeta function at zero for surfaces*, with Maciej Zworski, *Inventiones Mathematicae* **210**(2017), 211–229; [arXiv:1606.04560](#).
- [25] *Improved fractal Weyl bounds for hyperbolic manifolds*, with an appendix with David Borthwick and Tobias Weich, *Journal of the European Mathematical Society* **21**(2019), 1595–1639; [arXiv:1512.00836](#).
- [24] *Lower resolvent bounds and Lyapunov exponents*, with Alden Waters, *Applied Mathematics Research Express* 2016, 68–97; [arXiv:1508.04051](#).
- [23] *Spectral gaps, additive energy, and a fractal uncertainty principle*, with Joshua Zahl, *Geometric and Functional Analysis* **26**(2016), 1011–1094; [arXiv:1504.06589](#).
- [22] *Pollicott–Ruelle resonances for open systems*, with Colin Guillarmou, *Annales Henri Poincaré* **17**(2016), 3089–3146; [arXiv:1410.5516](#).
- [21] *Stochastic stability of Pollicott–Ruelle resonances*, with Maciej Zworski, *Nonlinearity* **28**(2015), 3511–3534; [arXiv:1407.8531](#).
- [20] *Spectral gaps for normally hyperbolic trapping*, *Annales de l’Institut Fourier* **66**(2016), 55–82; [arXiv:1403.6401](#).
- [19] *Power spectrum of the geodesic flow on hyperbolic manifolds*, with Frédéric Faure and Colin Guillarmou, *Analysis & PDE* **8**(2015), 923–1000; [arXiv:1403.0256](#).
- [18] *Resonances and lower resolvent bounds*, with Kiril Datchev and Maciej Zworski, *Journal of Spectral Theory* **5**(2015), 599–615; [arXiv:1402.0604](#).
- [17] *Dynamical zeta functions for Anosov flows via microlocal analysis*, with Maciej Zworski, *Annales de l’ENS* **49**(2016), 543–577; [arXiv:1306.4203](#).
- [16] *Trapping of waves and null geodesics for rotating black holes*, with Maciej Zworski, *Physical Review D* **88**(2013), 084037; [arXiv:1305.4603](#).
- [15] *Asymptotics of linear waves and resonances with applications to black holes*, *Communications in Mathematical Physics* **335**(2015), 1445–1485; [arXiv:1305.1723](#).
- [14] *Resonance projectors and asymptotics for  $r$ -normally hyperbolic trapped sets*, *Journal of the American Mathematical Society* **28**(2015), 311–381; [arXiv:1301.5633](#).
- [13] *Sharp polynomial bounds on the number of Pollicott–Ruelle resonances*, with Kiril Datchev and Maciej Zworski, *Ergodic Theory and Dynamical Systems* **34**(2014), 1168–1183; [arXiv:1208.4330](#).

- [12] *Fractal Weyl laws for asymptotically hyperbolic manifolds*, with Kiril Datchev, Geometric and Functional Analysis **23**(2013), 1145–1206; [arXiv:1206.2255](#).
- [11] *Scattering phase asymptotics with fractal remainders*, with Colin Guillarmou, Communications in Mathematical Physics **324**(2013), 425–444; [arXiv:1205.5955](#).
- [10] *Microlocal limits of plane waves and Eisenstein functions*, with Colin Guillarmou, Annales de l'ENS **47**(2014), 371–448; [arXiv:1204.1305](#).
- [9] *Quantum ergodicity for restrictions to hypersurfaces*, with Maciej Zworski, Nonlinearity **26**(2013), 35–52; [arXiv:1204.0284](#)
- [8] *Weighted eigenfunction estimates with applications to compressed sensing*, with Nicolas Burq, Rachel Ward, and Maciej Zworski, SIAM Journal on Mathematical Analysis **44**(2012), 3481–3501; [arXiv:1111.2383](#).
- [7] *Microlocal limits of Eisenstein functions away from the unitarity axis*, Journal of Spectral Theory **2**(2012), 181–202; [arXiv:1109.3338](#).
- [6] *Asymptotic distribution of quasi-normal modes for Kerr–de Sitter black holes*, Annales Henri Poincaré **13**(2012), 1101–1166; [arXiv:1101.1260](#).
- [5] Appendix to *Microlocal analysis of asymptotically hyperbolic and Kerr–de Sitter spaces*, by András Vasy, Inventiones Mathematicae **194**(2013), 381–513; [arXiv:1012.4391](#).
- [4] *Exponential energy decay for Kerr–de Sitter black holes beyond event horizons*, Mathematical Research Letters **18**(2011), 1023–1035; [arXiv:1010.5201](#).
- [3] *Quasi-normal modes and exponential energy decay for the Kerr–de Sitter black hole*, Communications in Mathematical Physics **306**(2011), 119–163; [arXiv:1003.6128](#).
- [2] *Symmetry of bound and antibound states in the semiclassical limit for a general class of potentials*, with Subhroshekhar Ghosh, Proceedings of the AMS **138**(2010), 3203–3210; [arXiv:0911.4282](#).
- [1] *The sectional curvature remains positive when taking quotients by certain nonfree actions*, Siberian Advances in Mathematics **18**(2008), 1–20; [arXiv:0710.3912](#).

### Book

*Mathematical theory of scattering resonances*, with Maciej Zworski, Graduate Studies in Mathematics **200**, American Mathematical Society, 2019.

### Expository work

- [8] *Fractal uncertainty in higher dimensions: notes on Cohen's paper*; [arXiv:2305.17857](#).
- [7] *Quantum ergodicity in theorems and pictures*, Notices of the American Mathematical Society **70**(2023), number 10.
- [6] *Macroscopic limits of chaotic eigenfunctions*, Proceedings of ICM 2022, Volume V, EMS Press, 2023, 3704–3723; [arXiv:2109.09053](#).
- [5] *Around quantum ergodicity*, Annales Mathématiques du Québec **46**(2022), 11–26; [arXiv:2103.08093](#).
- [4] *An introduction to fractal uncertainty principle*, Journal of Mathematical Physics **60**(2019), 081505; [arXiv:1903.02599](#).
- [3] *Notes on hyperbolic dynamics*; [arXiv:1805.11660](#).

- [2] *Afterword: Dynamical zeta functions for Axiom A flows*, with Colin Guillarmou, Bulletin of the American Mathematical Society **55**(2018), 337–342; [arXiv:1801.00348](#).
- [1] *Control of eigenfunctions on hyperbolic surfaces: an application of fractal uncertainty principle*, Proceedings of Journées Équations aux Dérivées Partielles 2017; [arXiv:1710.08762](#).

### Awards, honors, and grants

- Jul 2024 Frontiers of Science Award in Mathematics for the paper [32]
- Jul 2024 NSF Award DMS-2400090 ‘Microlocal Analysis and Hyperbolic Dynamics’
- Jul 2024 Simons Fellowship
- Dec 2022 CRM–ISM–AMQ Prize for the expository paper [5]
- Jul 2022 ICM sectional speaker (Dynamics, Partial Differential Equations)
- Jan 2022 AMS–EMS Mikhail Gordin Prize
- Jul 2020 MIT Teaching with Digital Technology Award
- Dec 2018 ICCM Best Paper Award for the paper [32]
- Jul 2018 IAMP Early Career Award
- Jul 2018 NSF CAREER Award DMS-1749858 ‘Classical and Quantum Chaos’
- Jul 2017 Sloan Research Fellowship
- Dec 2013 Birkhäuser prize for the paper [6] in Annales Henri Poincaré in 2012
- May 2013 Herb Alexander Prize (outstanding dissertation in pure mathematics), UC Berkeley
- Apr 2005 13th place at International Collegiate Programming Contest world finals
- Aug 2003 Silver medal at the International Olympiade in Informatics

### Editorial work

- 2022– Editor, Journal of Spectral Theory
- 2021– Editor, Cambridge Journal of Mathematics
- 2020– Associate Editor, Communications in Mathematical Physics
- 2019– Associate Editor, Probability and Mathematical Physics

### Teaching

- Spring 2025 18.090 (Introduction to Mathematical Reasoning), MIT
- Fall 2023 18.02 (Multivariable Calculus), MIT
- Fall 2022 18.155 (Differential Analysis I), MIT
- Spring 2022 18.118 (Topics in Analysis: Introduction to Chaotic Dynamics), MIT
- Spring 2022 18.S096 (Introduction to Mathematical Reasoning), joint with Paul Seidel, MIT
- Fall 2021 18.155 (Differential Analysis I), MIT
- Fall 2020 18.02 (Multivariable Calculus), MIT
- Spring 2020 18.03 (Differential Equations), MIT

Fall 2018 Math 279 (Topics in PDE/Semiclassical Analysis), UC Berkeley  
 Spring 2018 Math 1B (Calculus), UC Berkeley  
 Spring 2017 18.156 (Differential Analysis II/Scattering Theory), MIT  
 Spring 2016 18.125 (Measure Theory), MIT  
 Spring 2015 18.100A (Real Analysis), MIT  
 Spring 2012 Math 113 (Introduction to Abstract Algebra), UC Berkeley, teaching assistant  
 Summer 2010 Math 54 (Linear Algebra and Differential Equations), UC Berkeley, instructor  
 Spring 2010 Math 54, UC Berkeley, teaching assistant  
 Fall 2009 Math 1B (Calculus), UC Berkeley, teaching assistant

### Conferences and seminars organized

Jan 2025 Special session on Mathematical Quantum Chaos  
 at the Joint Mathematics Meetings, Seattle, WA  
 May 2024 Paris-Saclay conference in Analysis and PDE  
 May 2024 Conference ‘From Microlocal to Global Analysis @ MIT’  
 Nov 2023 Oberwolfach Seminar  
 ‘Scattering Resonances in Quantum Mechanics, General Relativity and Hyperbolic Dynamics’  
 Aug 2023 Summer school on fractal uncertainty principle  
 at University of Wisconsin, Madison  
 Sep 2022 Session on Semiclassical Approximation and Dynamical Systems  
 at QMath15, UC Davis  
 2018–2019 Bay Area Microlocal Analysis Seminar, UC Berkeley–Stanford  
 Oct 2017 Emerging Topics workshop on  
 Quantum Chaos and Fractal Uncertainty Principle at IAS, Princeton  
 Apr 2017 Special session on Microlocal Analysis and Spectral Theory  
 at the AMS Spring Western Sectional Meeting, Pullman, WA  
 2011–2012 Student Harmonic Analysis and PDE seminar, UC Berkeley

### Minicourses

*A quick introduction to  $b$ -calculus*, joint with Zhenhao Li

Oct–Nov 2024 Program in Special Geometric Structures and Analysis, MSRI

*Fractal uncertainty principle*

Sep 2024 Talk at the Student Harmonic Analysis and PDE seminar, UC Berkeley  
 Jul 2024 LMS–Bath Symposium: Advances in Spectral Theory, Bath  
 Nov 2023 Oberwolfach Seminar “Scattering Resonances in Quantum Mechanics,  
 General Relativity, and Hyperbolic Dynamics”  
 Dec 2022 Invited lecture as part of the course “Ergodicité et thermalisation des fonctions propres”  
 by Nalini Anantharaman, Collège de France (online)  
 Jun 2021 Séminaire de mathématiques supérieures “Microlocal Analysis: Theory and Applications”,  
 CRM Montréal (online)  
 Mar 2021 Spring School on Transfer Operators, Centre Bernoulli, Lausanne (online)  
 Jun 2020 Workshop ‘Lattice Point Distribution and Homogeneous Dynamics’, ICERM (online)  
 Oct 2017 Emerging Topics workshop, IAS, Princeton  
 Jul 2017 Third Symposium on Scattering and Spectral Theory, Florianópolis, Brazil

*Semiclassical analysis*, joint with Kiril Datchev

Jul–Aug 2019 Summer School in Semiclassical Analysis, Northwestern University

*Microlocal methods in hyperbolic dynamics*, joint with Maciej Zworski (in Nantes and Tokyo)

Oct 2022 Geometry and Analysis Seminar for Boston Area Graduate Students, MIT

Jul 2017 Summer school “Analytical aspects of hyperbolic flows”, Nantes

Jan 2017 Tokyo–Berkeley Mathematics Workshop, University of Tokyo

### Research talks

*Uncertainty principles and quantum chaos*

Jan 2025 Joint Mathematics Meetings, Seattle, WA

Jul 2022 International Congress of Mathematicians (recorded at a live event at MIT)

Jul 2018 International Congress on Mathematical Physics, Montreal

*Control of eigenfunctions in higher dimensions*

Sep 2024 Conference ‘Dynamical Systems, Number Theory, and Quantum Chaos’,  
University of Manchester, UK (online)

Jun 2024 Conference ‘Microlocal Analysis and Quantum Dynamics’, Northwestern University

*Microlocal analysis of internal waves in 2D aquaria*

Jul 2023 Program ‘Spectral Theory and Mathematical Relativity’, ESI, Vienna

Nov 2022 Workshop ‘Scattering and Inverse Scattering’, Linz, Austria (online)

Oct 2022 PDE/Analysis seminar, MIT

Jun 2022 Conference ‘Spectral Theory and Mathematical Physics’,  
Euler Institute, St. Petersburg (online)

Apr 2022 Ohio River Analysis Meeting, University of Kentucky

Jan 2022 Analysis & PDE seminar, Stanford University (online)

*Semiclassical measures for quantum cat maps*

Feb 2024 Analysis seminar, FernUniversität Hagen (online)

Oct 2022 Chern–Weil Symposium, University of Chicago

Sep 2022 Conference ‘Global Harmonic Analysis’ in honor of Steve Zelditch (online)

*Ruelle zeta at zero for nearly hyperbolic 3-manifolds*

Jul 2024 Conference ‘Dynamical Systems: Geometric and Statistical Properties’, Warwick

Nov 2022 Workshop ‘Geometrical Inverse Problems’, Linz, Austria (online)

Sep 2021 Seminar ‘Spectral Geometry in the Clouds’ (online)

Oct 2021 Workshop in Dynamical Systems and Related Topics, Penn State University

Jul 2021 Workshop ‘Dynamical Systems’, Oberwolfach (online)

May 2021 Conference ‘Analysis on Singular Spaces’, BIRS Oaxaca (online)

Apr 2021 Midwest Dynamics and Group Actions seminar (online)

Feb 2021 PDE/Analysis seminar, MIT (online)

*A microlocal toolbox for hyperbolic dynamics*

- Nov 2024 Mathematics Department Colloquium, University of Washington
- Nov 2022 Mathematics Department Colloquium, Northwestern University
- Jul 2019 Dynamics and PDE seminar, Yau Mathematical Sciences Center, Tsinghua University
- Mar 2015 Conference “Analysis and geometry of resonances”, CIRM, Marseille
- Jan 2015 Dynamics seminar, University of Maryland
- Jan 2015 Spectral and Scattering Theory Seminar, Purdue University
- Dec 2014 Mathematics Department Colloquium, UC Berkeley
- Nov 2014 Mathematics Department Colloquium, UCLA
- Nov 2014 Conference “Geometric scattering theory and applications”, Banff
- Oct 2014 Dynamical Systems seminar, Boston University

*What is quantum chaos?*

- Mar 2022 Mathematics Department Colloquium, Texas State University (online)
- Dec 2021 Fudan International Seminar on Analysis, PDEs, and Fluid mechanics (online)
- Dec 2021 Mathematics Department Colloquium, University College London (online)
- Nov 2021 Saint Petersburg seminar on Spectral theory and related topics (online)
- Oct 2021 Mathematics Department Colloquium, Michigan State University (online)
- May 2019 Mathematics Department Colloquium, Dartmouth College
- May 2019 Mathematics Department Colloquium, Northwestern University
- Jan 2018 Colloque des sciences mathématiques du Québec, Montreal
- Nov 2017 Mathematics Department Colloquium, University of Arizona
- Nov 2017 Mathematics Department Colloquium, UC Berkeley

*Fourier decay and spectral gaps on hyperbolic surfaces*

- Jun 2020 Seminar ‘analyse géométrique’ (online)
- Jan 2018 PDE/Analysis seminar, UC Berkeley
- Oct 2017 Dynamics seminar, University of Maryland

*Control of eigenfunctions on negatively curved surfaces*

- Jun 2021 Minisymposium ‘Spectral Theory and Integrable Systems’,  
European Congress of Mathematics (online)
- Apr 2021 Texas Analysis and Mathematical Physics Symposium (online)
- Feb 2021 Conference ‘Mathematics of Alexander Shnirelman’ (online)
- Jan 2021 Open PDE seminar (online)
- Nov 2020 Calderón–Zygmund analysis seminar, University of Chicago (online)
- Oct 2020 Analysis seminar, Princeton (online)
- Dec 2019 Working group seminar, UC Davis
- Nov 2019 Mathematics Department Colloquium, UC San Diego
- Nov 2019 SCAPDE conference, UC San Diego
- Oct 2019 Conference “Microlocal Analysis and Spectral Theory”, UC Berkeley
- Sep 2019 Conference “Dynamics, Equations, and Applications”, Kraków, Poland
- Aug 2019 QMath14 conference, Aarhus, Denmark
- Jun 2019 Conference “Microlocal Analysis and Applications”, SCMS, Fudan University
- Apr 2019 Conference “Probing the Earth and the Universe with Microlocal Analysis”, Banff
- Dec 2018 Geometry/Analysis seminar, Columbia University
- Oct 2018 Bay Area Microlocal Analysis Seminar, Stanford University
- Oct 2018 Mathematics Department Colloquium, MIT

*Semiclassical measures for hyperbolic surfaces*

- Jan 2019 Harmonic Analysis seminar, University of British Columbia
- Oct 2018 Special Session on Analysis and Geometry of Fractals,  
Fall AMS Western Sectional Meeting, San Francisco State University
- Jul 2018 Conference “Around quantum chaos”, Banff
- Mar 2018 Conference “New developments in open dynamical systems and their applications”, Banff
- Feb 2018 Western States Mathematical Physics meeting, UC Irvine
- Feb 2018 Geometry and Analysis seminar, UC Santa Cruz
- Jan 2018 Caltech/UCLA joint Analysis seminar, UCLA
- Jan 2018 Paris-Nord–Berkeley–Bonn–Zurich analysis videoseminar
- Dec 2017 Conference “Spectral geometry, graphs and semiclassical analysis”, Aussois, France
- Nov 2017 Mathematical Physics and Harmonic Analysis seminar, Texas A&M University
- Oct 2017 Geometry/Analysis seminar, Columbia University
- Jul 2017 Third Symposium on Scattering and Spectral Theory, Florianópolis, Brazil
- Jun 2017 PDE/Analysis seminar, University of Nice
- Jun 2017 Mathematical Physics seminar, University of Bristol
- Jun 2017 Conference “Complex and functional analysis and their interactions with harmonic analysis”,  
Polish Mathematical Conference Center, Będlewo
- Jun 2017 Conference “Analyse des équations aux dérivées partielles”, Roscoff
- Jun 2017 Numerical Analysis and PDE seminar, Université Paris-Sud
- May 2017 Differential Geometry/PDE Seminar, University of Washington
- May 2017 May Midwestern Microlocal Meeting, Purdue University



*Spectral gaps without the pressure condition*

- Oct 2018 Mathematical Picture Language Project Seminar, Harvard
- Sep 2017 Mathematics Department Colloquium, Tufts University
- Apr 2017 Mathematics Department Colloquium, Yale University
- Apr 2017 Pure Mathematics seminar, The University of Melbourne
- Mar 2017 Mathematics Department Colloquium, Australian National University
- Feb 2017 PDE/Analysis seminar, MIT
- Feb 2017 Conference “Harmonic analysis and geometry of fractal sets”, The Ohio State University
- Jan 2017 Analysis and PDE seminar, UC Berkeley
- Jan 2017 Analysis and PDE seminar, University of Kentucky

*Harmonic analysis issues related to hyperbolic surfaces*, on behalf of Jean Bourgain

- Sep 2017 Conference “Analysis and Applications” in honor of Elias Stein, Wrocław, Poland

*Dynamical zeta functions and topology for negatively curved surfaces*

- Jan 2017 Analysis and Geometry seminar, Northeastern University
- Nov 2016 PDE/Analysis seminar, Purdue University
- Nov 2016 Geometric Analysis seminar, MIT

*Spectral densification for hyperbolic surfaces*

- Dec 2016 Conference “Geometric and spectral methods in partial differential equations”, Oaxaca

*Resonances for open quantum maps*

- Nov 2021 Mathematical Picture Language Project Seminar, Harvard
- Nov 2016 PDE/Analysis seminar, Texas A&M University
- Sep 2016 PDE/Analysis seminar, MIT
- Sep 2016 Analysis and PDE seminar, UC Berkeley

*Spectral gaps via additive combinatorics*

- Nov 2016 Student Harmonic Analysis and PDE seminar, UC Berkeley
- Jun 2016 Workshop “Analytical methods in classical and quantum dynamical systems”, Pisa
- Apr 2016 Analysis seminar, IAS, Princeton
- Mar 2016 Program on dimension and dynamics, ICERM, Providence
- Sep 2015 International conference “Lavrentyev readings”, Novosibirsk, Russia
- Aug 2015 Workshop “Semiclassical analysis: spectral theory and resonances”, ESI, Vienna
- Jul 2015 International Congress on Mathematical Physics, Santiago, Chile
- Jun 2015 Conference “Geometric and computational spectral theory”, University of Montreal
- Jun 2015 Dynamics and PDE/Analysis seminar, University of Chicago
- Apr 2015 PDE/Analysis seminar, MIT
- Apr 2015 Bay Area Microlocal Analysis Seminar, Stanford University

*Spectral gaps and resonance counting for hyperbolic manifolds*

- Jul 2016 Analysis minicourse series, Yau Mathematical Sciences Center, Tsinghua University
- Jan 2016 Mathematics Department Colloquium, Rice University
- Dec 2015 Conference “Semiclassical analysis and nonselfadjoint operators”, CIRM, Marseille
- Nov 2015 HKUST IAS/Department of Mathematics Colloquium, Hong Kong, China

*Ringdown and geometry of black holes*

- Jan 2017 Colloquium, Black Hole Initiative, Harvard University
- Oct 2015 Workshop ‘Geometric hyperbolic PDE’, Imperial College London
- Sep 2015 Workshop ‘Recent advances in mathematical general relativity’, IHP, Paris
- Jun 2015 Workshop ‘Black hole stability’, Fields Institute, Toronto
- Apr 2014 PDE seminar, Brown University
- Mar 2014 Differential Equations seminar, University of Michigan

*Spectral gaps for normally hyperbolic trapping*

- Dec 2014 Student Harmonic Analysis and PDE seminar, UC Berkeley
- Nov 2014 Mathematical physics seminar, Caltech
- Oct 2014 Differential geometry seminar, Harvard University
- Jun 2014 Conference “Asymptotic Analysis in General Relativity”, Grenoble
- Jun 2014 Numerical Analysis and PDE seminar, Université Paris-Sud

*Pollicott–Ruelle resonances in constant curvature*

- Jun 2014 Conference “Microlocal Analysis and Applications”  
in honor of Gilles Lebeau, University of Nice
- May 2014 Midwest PDE seminar, Northwestern University
- Nov 2013 Student Harmonic Analysis and PDE seminar, UC Berkeley

*Dynamical zeta functions for Anosov flows via microlocal analysis*

- Jun 2014 STAMP workshop, ICMAT, Madrid
- May 2014 PDE/Analysis seminar, MIT
- Mar 2014 RTG Seminar on Geometry, Dynamics and Topology, University of Michigan
- Nov 2013 PDE/Analysis seminar, UC Berkeley

*Resonances for  $r$ -normally hyperbolic trapped sets*

- Nov 2013 Differential Equations seminar, University of Michigan
- Oct 2013 Mathematical General Relativity seminar, MSRI
- Sep 2013 Mathematics Department Colloquium, UC Santa Cruz
- Jun 2013 Conference ‘Spectral Theory and Partial Differential Equations’  
in honor of James Ralston, UCLA
- May 2013 PDE/Analysis seminar, MIT
- Apr 2013 Analysis seminar, IAS, Princeton
- Apr 2013 Analysis seminar, Princeton University
- Mar 2013 Analysis seminar, University of North Carolina
- Feb 2013 Paris-Nord–Berkeley–Bonn–Zurich analysis videoseminar
- Jan 2013 Analysis seminar, UCLA
- Dec 2012 Inverse Problems seminar, University of Washington
- Nov 2012 Geometry seminar, Stanford University
- Nov 2012 Student Harmonic Analysis and PDE seminar, UC Berkeley
- Nov 2012 Analysis seminar, Johns Hopkins University
- Oct 2012 Seminar ‘Spectral methods in classical and quantum chaos’, École Normale Supérieure

*Sharp polynomial bounds on the number of Pollicott–Ruelle resonances*

- Nov 2012 PDE/Analysis seminar, UC Berkeley
- Oct 2012 Mathematical physics seminar, Institut Fourier, Grenoble
- Oct 2012 Real analysis seminar, Institut de Mathématiques de Toulouse
- Oct 2012 Mathematical physics seminar, University of Lille
- Sep 2012 Dynamics seminar, University of Chicago

*Quantum ergodicity for restrictions to hypersurfaces*

- Oct 2012 Séminaire d'analyse non-linéaire et EDP, Institut Henri Poincaré, Paris
- Apr 2012 PDE/Analysis seminar, UC Berkeley

*Fractal Weyl laws for resonances on asymptotically hyperbolic manifolds*

- Sep 2012 Workshop ‘Weyl Law at 100’, Fields Institute, Toronto

*Microlocal limits of plane waves*

- Oct 2012 Seminar ‘Spectral methods in classical and quantum chaos’, École Normale Supérieure
- Oct 2012 Analysis seminar, University of Nantes
- Jul 2012 St. Petersburg Conference in Spectral Theory, Euler Institute
- Apr 2012 Bay Area Microlocal Analysis Seminar, Stanford University
- Apr 2012 Analysis seminar, McGill University

*Quantum ergodicity for Eisenstein functions at complex energies*

- Oct 2011 Analysis seminar, Northwestern University
- Oct 2011 Mathematical Physics seminar, Institut Fourier, Grenoble

*Quasi-normal modes for Kerr–de Sitter black holes*

- May 2012 Conference ‘Evolution equations’ in honor of Terence Tao, Northwestern University
- Apr 2012 General Relativity seminar, UC Berkeley
- Nov 2011 PDE/Analysis seminar, MIT
- May 2011 Séminaire Géométrie, EDP et Physique Mathématique, Université Cergy-Pontoise
- May 2011 Geometric Analysis and PDE seminar, University of Cambridge
- Apr 2011 Mathematical Physics seminar, Institut de Mathématiques de Bordeaux
- Apr 2011 Conference ‘Ondes en limite semi-classique’, Université Paris 13
- Mar 2011 Conference ‘Resonances and scattering in general relativity’, IM Bourgogne

*Scattering by (some) rotating black holes*

- Oct 2010 Inverse Problems seminar, MSRI
- Sep 2010 PDE/Analysis seminar, UC Berkeley
- Jul 2010 International Conference on Spectral Geometry, Dartmouth College, poster presentation

*Bound and antibound states*

- Sep 2009 Student Harmonic Analysis and PDE seminar, UC Berkeley