

Dr Jonathan Ben-Artzi

Research Areas	ANALYSIS OF NONLINEAR PDEs; KINETIC THEORY; SPECTRAL APPROXIMATION & COMPUTATION; SMOOTH ERGODIC THEORY & CONTINUOUS-TIME DYNAMICAL SYSTEMS; FUNCTIONAL INEQUALITIES	
Employment	Université Côte d'Azur , Nice, France	January-March 2024
	Professeur Invité, <i>Laboratoire Jean Alexandre Dieudonné</i>	
	Cardiff University , Cardiff, UK	Since September 2016
	<i>School of Mathematics</i> Reader (Associate Professor), since 2019 Senior Lecturer, 2016-2019 EPSRC Early Career Fellow, 2016-2022	
	Imperial College London , London, UK	2014-2017
Education	Junior Research Fellow, <i>Department of Mathematics</i>	
	University of Cambridge , Cambridge, UK	2011-2014
	Research Associate jointly at: <i>Cambridge Centre for Analysis</i> <i>Department of Applied Mathematics and Theoretical Physics</i> Supernumerary Fellow, <i>Pembroke College</i>	
	Brown University , Providence, Rhode Island, USA	
	Ph.D., Mathematics	May 2011
Fellowships, Grants & Awards	Advisor: Walter A. Strauss	
	M.Sc., Applied Mathematics	May 2009
	M.Sc., Mathematics	May 2008
	Teaching Certificate	May 2008
	Hebrew University of Jerusalem , Jerusalem, Israel	
	B.Sc., Mathematics-Physics (dual degree)	June 2006
	Marie Skłodowska-Curie Fellowship: €212,934 (ref. 885904, score: 93.2%)	2020-2022
	European Commission (role: supervisor of Dr Frank Rösler)	
	Marie Skłodowska-Curie Fellowship: €195,455 (ref. 790623, score: 100%)	2018-2020
	European Commission (role: supervisor of Dr Junyong Zhang)	
	LMS Research in Pairs (Scheme 4): £1200 (ref. 41817)	November 2018
	London Mathematical Society (for visit of Prof. Stephen Pankavich)	
	Outstanding Contribution Award	October 2018
	Cardiff University	
	SCoRE Cymru: £600 for visit of Dr Junyong Zhang (ref. SC17003)	April 2017
	Welsh European Funding Office	
	EPSRC Early Career Fellowship: £977,978 (ref. EP/N020154/1)	2016-2022
	UK Engineering and Physical Sciences Research Council	

Conference funding for the conference “*The Cauchy Problem in Kinetic Theory: Recent Progress in Collisionless Models*”, Imperial College London, September 2015:

❑ **LMS Conference Grant (Scheme 1): £7,000** (ref. 11443) March 2015
London Mathematical Society

❑ **EPSRC Platform Grant: £10,000** (ref. W031JB) February 2015
Department of Mathematics, Imperial College London

Junior Research Fellowship: £175,000 2014-2017
Imperial College London

Supernumerary Fellowship 2011-2013
Pembroke College, Cambridge

Outstanding Teaching Award May 2011
Department of Mathematics, Brown University

Young Researcher Travel Award April 2011
The Seventh IMACS Conference

Coline M. Makepeace Fellowship 2006-2007
Graduate School, Brown University

Preprints

24. Modified scattering of solutions to the relativistic Vlasov-Maxwell system inside the light cone
(with S. Pankavich)
Preprint, **arXiv:2306.11725**, 48 pages
23. Strichartz estimates for the Klein-Gordon equation in a conical singular space
(with F. Cacciafesta, A.-S. de Suzzoni and J. Zhang)
Preprint, **arXiv:2007.05331**, 44 pages
22. Computing Spectra – On the Solvability Complexity Index Hierarchy and Towers of Algorithms
(with M. J. Colbrook, A. C. Hansen, O. Nevanlinna and M. Seidel)
Preprint, **arXiv:1508.03280**, 93 pages
21. The Solvability Complexity Index - Computer Science and Logic Meet Scientific Computing
(with A. C. Hansen, O. Nevanlinna and M. Seidel)
Preprint, https://jbenartzi.github.io/papers/SCI_STOC_Final.pdf, 15 pages

Publications

20. A uniform ergodic theorem for degenerate flows on the annulus
(with B. Morisse)
Communications on Pure and Applied Analysis 22(9), 2814-2827 (2023)
19. On the complexity of the inverse Sturm-Liouville problem
(with M. Marletta and F. Rösler)
Pure and Applied Analysis (accepted), **arXiv:2203.13078**, 27 pages
18. Asymptotic Growth and Decay of Two-Dimensional Symmetric Plasmas
(with B. Morisse and S. Pankavich)
Kinetic and Related Models, online first, <https://doi.org/10.3934/krm.2023015>
17. Computing scattering resonances
(with M. Marletta and F. Rösler)
J. Eur. Math. Soc. (JEMS), online first, <https://doi.org/10.4171/jems/1258>
16. Global Strichartz estimates for the Dirac equation on symmetric spaces

- (with F. Cacciafesta, A.-S. de Suzzoni and J. Zhang)
Forum of Math., Sigma 10(e25), 1-38 (2022)
15. Universal algorithms for computing spectra of periodic operators
 (with M. Marletta and F. Rösler)
Numer. Math. 150, 719-767 (2022)
 14. A toy model for the relativistic Vlasov-Maxwell system
 (with S. Pankavich and J. Zhang)
Kinetic and Related Models 15(3), 341-354 (2022)
 13. Computing the sound of the sea in a seashell
 (with M. Marletta and F. Rösler)
Found. Comput. Math. (FoCM) 22, 697-731 (2022)
 12. Uniform convergence in von Neumann's ergodic theorem in the absence of a spectral gap
 (with B. Morisse)
Ergod. Theor. Dyn. Syst. 41(6), 1601-1611 (2021)
 11. Weak Poincaré inequalities in the absence of spectral gaps
 (with A. Einav)
Ann. Henri Poincaré 21(2), 359-375 (2020)
 10. Concentrating solutions of the relativistic Vlasov-Maxwell system
 (with S. Calogero and S. Pankavich)
Commun. Math. Sci. 17(2), 377-392 (2019)
 9. Arbitrarily large solutions of the Vlasov-Poisson system
 (with S. Calogero and S. Pankavich)
SIAM J. Math. Anal. 50(4), 4311-4326 (2018)
 8. Instabilities of the relativistic Vlasov-Maxwell system on unbounded domains
 (with T. Holding)
SIAM J. Math. Anal. 49(5), 4024-4063 (2017)
 7. Moment bounds on the corrector of stochastic homogenization of non-symmetric elliptic finite difference equations (with D. Marahrens and S. Neukamm)
Commun. PDE 42(2), 179-234 (2017)
 6. Approximations of strongly continuous families of unbounded operators
 (with T. Holding)
Commun. Math. Phys. 345(2), 615-630 (2016)
 5. Instabilities in kinetic theory and their relationship to the ergodic theorem
Contemp. Math. 653, 25-40 (2015)
 4. New barriers in complexity theory: On The Solvability Complexity Index and Towers of Algorithms
 (with A. C. Hansen, O. Nevanlinna and M. Seidel)
C. R. Acad. Sci. 353, 931-936 (2015)
 3. On the spectrum of shear flows and uniform ergodic theorems
J. Funct. Anal. 267, 299-322 (2014)
 2. Instability of nonsymmetric nonmonotone equilibria of the Vlasov-Maxwell system
J. Math. Phys. 52, 123703, pp. 1-21 (2011)
 1. Instability of nonmonotone magnetic equilibria of the relativistic Vlasov-Maxwell system

**Invited
Conference
Talks**

- PDE & Probability in interaction: functional inequalities, optimal transport and particle systems**
CIRM, Luminy, France (scheduled) January 2024
- Spectral and Resonance Problems for Imaging, Seismology and Materials Science**
Université Reims Champagne-Ardennes, Reims, France (scheduled) November 2023
- International Workshop on Operator Theory and its Applications:**
1. Special Session on Operator Theory in Elliptic PDEs
2. Special Session on Non-Selfadjoint Operators
University of Helsinki, Helsinki, Finland August 2023
- Stability Analysis for Nonlinear PDEs**
OxPDE, University of Oxford, Oxford, UK August 2022
- Mathematical aspects of the physics with non-self-adjoint operators**
Banff International Research Station, Alberta, Canada July 2022
- International Workshop on Operator Theory and its Applications: Special Session on Spectral Theory and Differential Operators**
Lancaster University, Lancaster, UK (online) August 2021
- Modélisation océan-atmosphère**
Université de Rennes 1, Rennes, France September 2019
- The 23rd Bi-Annual Mini-Workshop in Applied and Computational Mathematics**
Hebrew University of Jerusalem, Jerusalem, Israel December 2018
- South-West Network in Generalised Solutions for Nonlinear PDEs**
Cardiff University, Cardiff, UK September 2017
- Montréal Analysis Seminar**
McGill University, Montréal, Canada April 2017
- Workshop on Hilbert's Sixth Problem**
University of Leicester, Leicester, UK May 2016
- London Analysis Seminar**
University College London, London, UK November 2015
- Bath-WIMCS Analysis Day**
Cardiff University, Cardiff, UK September 2015
- Kinetic and Related Equations**
BIRS-CMO, Oaxaca, Mexico July 2015
- Complex Analysis & Dynamical Systems VII**
Nahariya, Israel May 2015
- Microlocal Day 5**
Imperial College London, London, UK January 2015
- The 10th AIMS Conference on Dynamical Systems, Differential Equations and Applications: Special Session on Kinetic Models**
Madrid, Spain July 2014

	Mathematical Topics in Kinetic Theory University of Cambridge, Cambridge, UK	June 2013
	Complex Analysis & Dynamical Systems VI Nahariya, Israel	May 2013
	Probabilistic Methods in Kinetic Theory CIRM, Luminy, France	July 2011
	The Seventh IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory University of Georgia, Athens, GA, USA	April 2011
Postdoc Mentoring	<p>Frank Rösler, 2018-2022. Frank received his PhD in 2018 under the supervision of Prof. Patrick Dondl at Durham/Freiburg Universities. Frank was awarded a Marie Skłodowska-Curie Fellowship while in Cardiff. He is now a researcher at the Fraunhofer Institute in Nuremberg, Germany.</p> <p>Junyong Zhang, 2018-2020. Junyong received his PhD in 2011 under the supervision of Prof. Changxing Miao at the Institute of Applied Physics and Computational Mathematics in Beijing. Junyong was awarded a Marie Skłodowska-Curie Fellowship while in Cardiff. He is now a Professor at the Beijing Institute of Technology.</p> <p>Baptiste Morisse, 2017-2020. Baptiste received his PhD in 2017 under the supervision of Dr Benjamin Texier at Université Paris-Diderot. He now works for Thales.</p>	
PhD Students	<p>Alexei Stepanenko, 2018-2022. Alexei's thesis was entitled "Spectral approximation and eigenvalue bounds for differential operators", jointly supervised with Prof. Marco Marletta. Alexei went on to Cambridge University with a Fellowship awarded by the London Mathematical Society.</p> <p>Thomas Holding, 2012-2016. Thomas' thesis was entitled "Asymptotic Behaviour and Derivation of Mean Field Models" for which I served as a junior doctoral supervisor under Profs. José A. Carrillo and Clément Mouhot. Thomas went on to a postdoctoral position with Prof. Martin Hairer.</p>	
Teaching	Université Côte d'Azur, Nice, France 2024 Doctoral Teaching <input type="checkbox"/> <i>Mini-course on the Solvability Complexity Index and the computation of resonances</i> , Spring 2024 (scheduled) Course taught as a Professeur Invité.	
	Cardiff University, Cardiff, Wales, UK Since 2016 Undergraduate & Masters Teaching <input type="checkbox"/> <i>Partial Differential Equations</i> (MA3016), Autumn 2023 (scheduled) <input type="checkbox"/> <i>Partial Differential Equations</i> (MA3016), Autumn 2022 <input type="checkbox"/> <i>Differential Geometry of Curves and Surfaces</i> (MA3010), Autumn 2018 Doctoral Teaching <input type="checkbox"/> <i>Theory of Partial Differential Equations</i> (MAGIC058), Autumn 2023 (scheduled) Course taught via video conferencing at the <i>MAGIC (Mathematics Access Grid Instruction and Collaboration)</i> consortium, which is a joint postgraduate teaching centre run between 22 UK universities.	
	Imperial College London, London, UK 2014-2016 Doctoral Teaching	

- ❑ *Dispersive Equations* (taught jointly with Dr Arick Shao), Autumn 2015

Course taught via video conferencing at the *TCC (Taught Course Centre)*, which is a joint postgraduate teaching centre run between the universities of Bath, Bristol, Imperial College, Oxford and Warwick.

University of Cambridge, Cambridge, UK 2011-2014

Doctoral Teaching

- ❑ Supervision of Doctoral PDE course project "*Incompressible flows and the Beale-Kato-Majda criterion*", 2011-2012
- ❑ Teaching Assistant for Doctoral course *Kinetic Theory*, Autumn 2011

Undergraduate Course Supervisions

- ❑ *Vector Calculus*, Spring 2013
- ❑ *Vector Calculus*, Spring 2012
- ❑ *Numerical Analysis*, Spring 2013
- ❑ *Vectors and Matrices*, Autumn 2012
- ❑ *Methods of Mathematical Physics*, Autumn 2012
- ❑ *Methods of Mathematical Physics*, Autumn 2011

Brown University, Providence, Rhode Island, USA 2006-2011

Undergraduate Teaching

- ❑ *Multivariable Calculus* (MA 0180), Autumn 2010
- ❑ *Multivariable Calculus* (MA 0180), Autumn 2009
- ❑ *Analytic Geometry and Calculus* (MA 0060), Spring 2009
- ❑ *Honors Multivariable Calculus* (MA 0350), Autumn 2008

Sheridan Center Teaching Certificate, Completed May 2008

Undergraduate & Masters Student Supervision

Cardiff University, Cardiff, UK Since 2016

- ❑ Oliver Nelson: "*The Axiom of Choice and the Banach-Tarski Paradox*", 2022-2023
- ❑ Ronak Sachin Chavan: "*Human Factors in Process Safety Events*", Summer 2022
- ❑ Thomas Anquetil: "*Kinetic Theory*", Summer 2018

Imperial College London, London, UK 2014-2016

- ❑ Maria del Valle Varo: "*Hilbert's Sixth Problem: From Micro to Macroscopic Descriptions*", Summer 2016
- ❑ Paul Ramond: "*Landau Damping: Physics vs Mathematics*", 2015-2016
- ❑ Wei Yu: "*Infinite-dimensional spaces, the spectral theorem and the ergodic theorem*", Summer 2015
- ❑ Charafeddine Mouzouni: "*Topics in existence, uniqueness and stability of solutions to Vlasov systems in Kinetic Theory*", Spring 2015

University of Cambridge, Cambridge, UK 2011-2014

- ❑ Zhuo Min Lim: "*Jeans' Theorem in Kinetic Theory*", 2013-2014
- ❑ Thomas Holding: "*Instability of the Vlasov-Maxwell system on unbounded domains*", 2012-2013
- ❑ Luca Calatroni: "*Linear stability and instability of plasmas*", 2011-2012

Event & Seminar Organisation

Organiser, Intradisciplinary Lecture Series, Cardiff University 2018-present

Co-organiser: South Wales Analysis and Probability Seminar (SWAP)
Cardiff and Swansea Universities 2018-present

Joint organiser of a seminar series alternating between Cardiff and Swansea (3-4 times a year) focusing on analysis and probability with local and external speakers. Website [link](#).

Organiser, Cardiff Informal Analysis & PDE Seminar, Cardiff University 2017-present

Co-Organiser, Cardiff Analysis Online Seminar (CAOS), Cardiff University 2020-2022

Organiser, Analysis Seminar, Cardiff University 2019-2020

Workshop Organiser: “Small Scales and Homogenisation (SmaSH)”

Cardiff University June 2019

Jointly organised (with B. Morisse and F. Rösler) an international workshop with 10 invited speakers and a total of 40 participants. [Website](#).

Workshop Organiser: “An Analyst, a Geometer and a Probabilist Walk Into a Bar”

Cardiff University June 2018

Jointly organised (with B. Morisse) an international workshop with 11 invited speakers and a total of 40 participants. [Website](#).

Conference Organiser: “The Cauchy Problem in Kinetic Theory: Recent Progress in Collisionless Models”

Imperial College London September 2015

Jointly organised (with M. Hadžić and S. Pankavich) an international conference with 25 invited speakers and a total of 50 participants. [Website](#).

Co-organiser, Analysis Seminar, Imperial College London 2015-2016

Local Organiser: “Mathematical Topics in Kinetic Theory”

University of Cambridge June 2013

Organiser, PDE Seminar, University of Cambridge 2011-2014

Organiser, Informal PDE Seminar, Brown University 2010-2011

Service & Administration

Member of School Ethics Committee, School of Mathematics, Cardiff University 2023-present

Special Issue Editor, *Mathematics* (journal) 2020

Editor of special issue “Modern Analysis and Partial Differential Equations”.

Member of Internal Review Panel, Cardiff University

January 2020

Member of the Round 5 UKRI Future Leaders Fellowships Expression of Interest panel within the College of Physical Sciences and Engineering.

Member of University Senate, Cardiff University

2019-2020

Member of School Research Committee, School of Mathematics, Cardiff University

2019-2021

Postdoc Representative, Department of Mathematics, Imperial College London

2014-2015

Responsible for representing postdocs of the mathematics department to the College, and organising career development and social events.

Grant Refereeing: Czech Science Foundation, UK Engineering and Physical Sciences Research Council, Research Grants Council of Hong Kong, Agence Nationale de la Recherche (France)

Journal Refereeing: Discrete and Continuous Dynamical Systems - Series A, Kinetic and Related Models, Rocky Mountain Journal of Mathematics, Journal of Functional Analysis, SIAM Journal on Mathematical Analysis, Communications in Partial Differential Equations, Communications in Mathematical Physics, Advances in Mathematics, Journal of Differential Equations, Journal of Computational and Applied Mathematics, Proceedings of the London Mathematical Society, Journal of Ocean Engineering and Marine Energy, Proceedings of the Royal Society of Edinburgh, Nonlinearity, Journal de Mathématiques Pures et Appliquées, Mathematische Annalen, Foundations of Computational Mathematics, Journal of Approximation Theory

Reviewer, Mathematical Reviews

2012-*present*

Seminar Talks

2024: Université Côte d'Azur (scheduled), Université Grenoble Alpes (scheduled), Université de Rennes (scheduled)

2023: Université d'Orléans (scheduled), Université de Tours

2022: University of Bremen, University of Oxford

2019: Université de Rennes, Swansea University, University of Warwick

2018: Hebrew University of Jerusalem

2017: McGill University, Princeton University

2016: University of Crete, University of Leicester, University of Surrey, University of Sussex

2015: University of Bath, Cardiff University, University of Glasgow, Hebrew University of Jerusalem, University College London, Université Aix-Marseille, University of Oxford, University of Reading, University of Warwick

2014: Imperial College London

2013: University of Durham

2012: Université Paris Nord (13), University of Warwick

2011: University of Cambridge, Max Planck Institute Leipzig, University of Oxford, Technion-Israel Institute of Technology, Imperial College London

2010: Columbia University, Brown University

Academic Visits

Université Côte d'Azur, Nice, France: January-March 2024 (two months)

Hebrew University of Jerusalem, Jerusalem, Israel: December 2018 (one week)

Brown University, Providence, RI, USA: April 2017 (one week), March 2012 (one week)

Durham University, Durham, UK: June 2016 (one month)

Max Planck Institute, Leipzig, Germany: March 2014 (one week), June 2013 (one week), April 2013 (one week), December 2012 (two weeks), April 2012 (one week), February 2012 (one week), January 2012 (one week), December 2011 (one week)

Université Paris 13, Paris, France: November 2012 (one week)

Computer Code

Code for Publication 19 (inverse Sturm-Liouville problem):

https://github.com/jbenartzi/inverse_SCI

Code for Publication 17 (quantum scattering resonances):

https://github.com/jbenartzi/Resonances_SCI_1d

Code for Publication 15 (spectra of periodic operators, 2D):

<https://github.com/jbenartzi/PeriodicSpectra2d>

Code for Publication 15 (spectra of periodic operators, 1D):

<https://github.com/jbenartzi/PeriodicSpectra>

Code for Publication 13 (classical scattering resonances):

<https://github.com/jbenartzi/SeashellComp>

Memberships

London Mathematical Society, member

2014-*present*

American Mathematical Society, member

2018-*present*

Language Skills

Hebrew (native), **English** (fluent), **French** (proficient)

Contact Information

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Wales, United Kingdom

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