

# Dr Jonathan Ben-Artzi

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<b>Research Areas</b>	Spectral analysis, Ergodic theory, Analysis of Nonlinear PDEs, Kinetic theory, Computational complexity in infinite dimensions	
<b>Employment</b>	<b>Cardiff University</b> , Cardiff, UK	Since September 2016
	<i>School of Mathematics</i>	
	Reader (Associate Professor), since 2019	
	Senior Lecturer, 2016-2019	
	EPSRC Early Career Fellow, 2016-2021	
	<b>Durham University</b> , Durham, UK	July-September 2016
	Lecturer (Tenured Assistant Professor), <i>Department of Mathematical Sciences</i>	
	<b>Imperial College London</b> , London, UK	2014-2017
	Junior Research Fellow, <i>Department of Mathematics</i> (resigned 2016)	
	<b>University of Cambridge</b> , 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>	
<b>Qualifications</b>	<b>Brown University</b> , Providence, Rhode Island, USA	
	Ph.D., Mathematics	May 2011
	Advisor: Walter A. Strauss	
	M.Sc., Applied Mathematics	May 2009
	M.Sc., Mathematics	May 2008
	Teaching Certificate	May 2008
	<b>Hebrew University of Jerusalem</b> , Jerusalem, Israel	
	B.Sc., Mathematics-Physics (dual degree)	June 2006
<b>Fellowships, Grants &amp; Awards</b>	<b>Marie Skłodowska-Curie Fellowship: €212,934</b> (ref. 885904)	2020-2022
	European Commission (role: supervisor of Dr Frank Rösler)	
	<b>LMS Research in Pairs (Scheme 4): £1200</b> (ref. 41817)	November 2018
	London Mathematical Society (for visit of Prof. Stephen Pankavich)	
	<b>Outstanding Contribution Award</b>	October 2018
	Cardiff University	
	<b>Marie Skłodowska-Curie Fellowship: €195,455</b> (ref. 790623)	2018-2020
	European Commission (role: supervisor of Dr Junyong Zhang)	
	<b>EPSRC Early Career Fellowship: £977,978</b> (ref. EP/N020154/1)	2016-2021
	UK Engineering and Physical Sciences Research Council	
	<b>SCoRE Cymru: £600</b> for visit of Dr Junyong Zhang (ref. SC17003)	April 2017
	Welsh European Funding Office	

**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

## Submitted Papers

15. Averaging along degenerate flows on the annulus  
(with B. Morisse)  
*Submitted, arXiv:1902.06681*, 14 pages
14. Computing Spectra – On the Solvability Complexity Index Hierarchy and Towers of Algorithms  
(with M. J. Colbrook, A. C. Hansen, O. Nevanlinna and M. Seidel)  
*Submitted, arXiv:1508.03280*, 95 pages
13. 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/Files/SCI\\_STOC\\_Final.pdf](https://jbenartzi.github.io/Files/SCI_STOC_Final.pdf)*, 15 pages

## Publications

12. Uniform convergence in von Neumann’s ergodic theorem in the absence of a spectral gap  
(with B. Morisse)  
*Ergod. Theor. Dyn. Syst.*, to appear (2020)
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  
*Nonlinearity* **24**, 3353-3389 (2011)

**Invited  
Conference  
Talks**

<b>Modélisation océan-atmosphère</b> Université de Rennes 1, Rennes, France	September 2019
<b>The 23rd Bi-Annual Mini-Workshop in Applied and Computational Mathematics</b> Hebrew University of Jerusalem, Jerusalem, Israel	December 2018
<b>South-West Network in Generalised Solutions for Nonlinear PDEs</b> Cardiff University, Cardiff, UK	September 2017
<b>Montréal Analysis Seminar</b> McGill University, Montréal, Canada	April 2017
<b>Workshop on Hilbert's Sixth Problem</b> University of Leicester, Leicester, UK	May 2016
<b>London Analysis Seminar</b> University College London, London, UK	November 2015
<b>Bath-WIMCS Analysis Day</b> Cardiff University, Cardiff, UK	September 2015
<b>BIRS-CMO Workshop: Kinetic and Related Equations</b> Oaxaca, Mexico	July 2015
<b>Complex Analysis &amp; Dynamical Systems VII</b> Nahariya, Israel	May 2015
<b>Microlocal Day 5</b> Imperial College London, London, UK	January 2015
<b>The 10th AIMS Conference on Dynamical Systems, Differential Equations and Applications: Special Session on Kinetic Models</b> Madrid, Spain	July 2014

	<b>Mathematical Topics in Kinetic Theory</b> University of Cambridge, Cambridge, UK	June 2013
	<b>Complex Analysis &amp; Dynamical Systems VI</b> Nahariya, Israel	May 2013
	<b>Probabilistic Methods in Kinetic Theory</b> CIRM, Luminy, France	July 2011
	<b>The Seventh IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory</b> University of Georgia, Athens, GA, USA	April 2011
<b>Event &amp; Seminar Organisation</b>	<b>Organiser</b> , Analysis Seminar, Cardiff University	2020-present
	<b>Organiser</b> , Intradisciplinary Lecture Series, Cardiff University	2018-present
	<b>Co-organiser: South Wales Analysis and Probability Seminar (SWAP)</b> Cardiff and Swansea Universities	2018-present
	<i>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: <a href="https://jbenartzi.github.io/SWAP/">https://jbenartzi.github.io/SWAP/</a></i>	
	<b>Workshop Organiser: “Small Scales and Homogenisation (SmaSH)”</b> Cardiff University	June 2019
	<i>Jointly organised (with B. Morisse and F. Rösler) an international workshop with 10 invited speakers from around the world, and a total of 40 participants. Website: <a href="https://smash-workshop.github.io/">https://smash-workshop.github.io/</a></i>	
	<b>Workshop Organiser: “An Analyst, a Geometer and a Probabilist Walk Into a Bar”</b> Cardiff University	June 2018
	<i>Jointly organised (with B. Morisse) an international workshop with 11 invited speakers and a total of 40 participants. Website: <a href="https://jbenartzi.github.io/Conference-2018/index.html">https://jbenartzi.github.io/Conference-2018/index.html</a>.</i>	
	<b>Conference Organiser: “The Cauchy Problem in Kinetic Theory: Recent Progress in Collisionless Models”</b> Imperial College London	September 2015
	<i>Served as the main organiser of an international conference of over 25 invited speakers from around the world, and a total of 50 participants. Obtained funding (see above), set up a website (<a href="https://jbenartzi.github.io/Conference-2015/index.html">https://jbenartzi.github.io/Conference-2015/index.html</a>), produced a poster (available on the website) and handled all other administrative aspects.</i>	
	<b>Co-organiser</b> , Analysis Seminar, Imperial College London	2015-2016
	<b>Local Organiser: “Mathematical Topics in Kinetic Theory”</b> University of Cambridge	June 2013
	<b>Organiser</b> , PDE Seminar, University of Cambridge	2011-2014
	<b>Organiser</b> , Informal PDE Seminar, Brown University	2010-2011
<b>Service</b>	<b>Member of Internal Review Panel</b> , Cardiff University	January 2020
	<i>Member of the Round 5 UKRI Future Leaders Fellowships Expression of Interest panel within the College of Physical Sciences and Engineering.</i>	
	<b>Member of University Senate</b> , Cardiff University	2019-2022

	<b>Member of School Research Committee</b> , School of Mathematics, Cardiff University	2019-2021
	<b>Postdoc Rep</b> , Department of Mathematics, Imperial College London	2014-2015
	<i>Responsible for representing postdocs of the mathematics department to the College, and organising career development and social events.</i>	
	<b>Grant Refereeing:</b> Czech Science Foundation, UK Engineering and Physical Sciences Research Council, Research Grants Council of Hong Kong, Agence Nationale de la Recherche (France)	
	<b>Journal Refereeing:</b> 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	
	<b>Reviewer</b> , Mathematical Reviews	2012-present
<b>Postdoc Mentoring</b>	<b>Junyong Zhang, 2018-2021.</b> 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.	
	<b>Frank Rösler, 2018-2022.</b> 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.	
	<b>Baptiste Morisse, 2017-2020.</b> Baptiste received his PhD in 2017 under the supervision of Dr Benjamin Texier at Paris-Diderot. <i>Baptiste went on to work as a researcher at Sivienn.</i>	
<b>PhD Students</b>	<b>Alexei Stepanenko, 2018-2022.</b> Alexei's project involves rigorous aspects of spectral approximation & computation. Joint supervision with Prof. Marco Marletta.	
	<b>Thomas Holding, 2012-2016.</b> Served as a junior doctoral supervisor and coauthored papers [6] and [8] above. Thomas went on to a postdoctoral position with Prof. Martin Hairer (Imperial).	
<b>Undergraduate &amp; Masters Student Supervision</b>	<b>Cardiff University</b> , Cardiff, UK	Since 2016
	<b>Masters and Undergraduate</b>	
	□ Thomas Anquetil: <i>"Kinetic Theory"</i> , Summer 2018	
	<b>Imperial College London</b> , London, UK	2014-2016
	<b>Masters and Undergraduate</b>	
	□ Maria del Valle Varo: <i>"Hilbert's Sixth Problem: From Micro to Macroscopic Descriptions"</i> , Summer 2016	
	□ Paul Ramond: <i>"Landau Damping: Physics vs Mathematics"</i> , 2015-2016	
	□ Wei Yu: <i>"Infinite-dimensional spaces, the spectral theorem and the ergodic theorem"</i> , Summer 2015	
	□ Charafeddine Mouzouni: <i>"Topics in existence, uniqueness and stability of solutions to Vlasov systems in Kinetic Theory"</i> , Spring 2015	
	<b>University of Cambridge</b> , Cambridge, UK	2011-2014
	<b>Masters</b>	
	□ Zhuo Min Lim: <i>"Jeans' Theorem in Kinetic Theory"</i> , 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

## Teaching

**Cardiff University**, Cardiff, Wales, UK Since 2016

### Undergraduate Teaching

- *Differential Geometry of Curves and Surfaces* (MA3010), Autumn 2018

**Imperial College London**, London, UK 2014-2016

### Postgraduate Teaching

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

Course taught via video conferencing at the *Taught Course Centre*, a joint postgraduate teaching centre between Bath, Bristol, Imperial College, Oxford and Warwick.

**University of Cambridge**, Cambridge, UK 2011-2014

### Postgraduate Teaching

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

### Undergraduate Course Supervisions

- *Methods*, Autumn 2011 & 2012
- *Vectors and Matrices*, Autumn 2012
- *Vector Calculus*, Spring 2012 & 2013
- *Numerical Analysis*, Spring 2013

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

### Undergraduate Teaching

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

**Sheridan Center Teaching Certificate**, Completed May 2008

## Seminar Talks

Brown University, Cardiff University, Columbia University, Hebrew University of Jerusalem, Imperial College London, Max Planck Institute Leipzig, McGill University, Princeton University, Technion–Israel Institute of Technology, Université Aix-Marseille, University of Bath, University of Cambridge, University of Crete, University of Glasgow, University of Oxford, Université Paris Nord (13), University of Reading, University of Surrey, University of Sussex, University of Warwick.

## Academic Visits

**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)

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

## Memberships

**London Mathematical Society**, member 2014–*present*

**American Mathematical Society**, member 2018–*present*

**Contact  
Information**

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