

# Amanda Turner

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## RESEARCH INTERESTS

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My research lies in the area of probability, with a particular interest in random growth processes. Specifically, my recent work has been motivated by diffusion-limited aggregation (DLA). This is a random fractal growth model which describes how minerals cluster together and has many applications in physics and chemistry as well as industrial processes. This model is notoriously difficult to understand, with only one rigorous result having been proved in the 30 years since it was first formulated. My research uses conformal mappings to model the arrival of particles, which enables the use of techniques from complex analysis that have been very fruitful in areas such as Schramm–Loewner evolution (SLE). By altering the sizes of particles and their positions in various ways, a wide class of growth models can be described, which include both DLA and the Eden model for biological growth. I am particularly interested in the limiting behaviour of these clusters when the particle sizes are very small, but large numbers of particles are present and, in several cases, have been able to obtain detailed descriptions of the limiting shapes and internal structures that arise.

## EDUCATION

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- 2002 – 2006     **PhD in Mathematics**  
DEPARTMENT OF PURE MATHEMATICS AND MATHEMATICAL STATISTICS,  
UNIVERSITY OF CAMBRIDGE, UK  
Title: *Scaling Limits of Stochastic Processes*  
Supervised by Professor James Norris
- 2001 – 2002     **Certificate of Advanced Study in Mathematics (Part III) – Distinction**  
ST JOHN'S COLLEGE, UNIVERSITY OF CAMBRIDGE, UK
- 1998 – 2001     **B.A. (Hons) Mathematics - First Class**  
ST JOHN'S COLLEGE, UNIVERSITY OF CAMBRIDGE, UK  
Ranked in the top 15 out of approximately 250 in all three years

## FULL TIME EMPLOYMENT

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- 2015 –           **Senior Lecturer in Mathematics and Statistics**  
DEPARTMENT OF MATHEMATICS AND STATISTICS,  
LANCASTER UNIVERSITY, UK
- 2007 – 2015     **Lecturer in Mathematics and Statistics**  
DEPARTMENT OF MATHEMATICS AND STATISTICS,  
LANCASTER UNIVERSITY, UK
- 2006 – 2007     **College Teaching Fellow**  
SELWYN COLLEGE, UNIVERSITY OF CAMBRIDGE, UK

## GRANTS, AWARDS & HONOURS

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- Awarded **LMS (London Mathematical Society) Conference Grant** to host the 2016 UK Easter Probability Meeting at Lancaster University (2015).
- Awarded **visiting fellowship of the Isaac Newton Institute for Mathematical Sciences** to participate in the programme “Random Geometry” (2015).
- Awarded **US Federal Agency Travel Award** to present talk at the Conference on Stochastic Processes and their Applications (SPA), Boulder Colorado, USA (2013).
- Awarded **shorter Knowledge Transfer Partnership (sKTP) Grant** for collaboration between Lancaster University and BT (2013).
- Appointed Vice Chair (2012-2014) and Chair (2014-present) of the Applied Probability Section of the **RSS (Royal Statistical Society)**.
- Awarded **LMS (London Mathematical Society) Research in Pairs Grant** to conduct research at the **Mittag-Leffler Institute** in Stockholm (2011).

Member of the International Organizing Committee for the **European Young Statisticians Meeting (EYSM)** in Lisbon (2011).

One of the two participants from the United Kingdom selected to attend the **European Young Statisticians Meeting (EYSM)** in Bucharest (2009).

Awarded **Centre of Excellence in Teaching and Learning (CETL) Grant** for an educational research miniproject (2008).

Awarded **IMS Laha Travel Awards** to present papers at the World Congress in Probability and Statistics in Barcelona (2004) and in Singapore (2008).

Chair of the Organising Committee for the **Research Students Conference in Probability and Statistics** in Cambridge (2005).

Received **EPSRC (Engineering and Physical Sciences Research Council) Studentship** to fund PhD studies (2002 - 2005).

Awarded **St John's College Benefactors' Scholarship** to fund Certificate of Advanced Study in Mathematics (2001).

Awarded **Horne Scholarship** (1999 - 2002), **Leathem Prize** (1999), **Johnston Prize** (1999), **Lapwood-Towle Prize** (2000), **Hockin Prize** (2001) and **Wright Prize** (2002) for outstanding performance in university examinations.

## PAPERS AND PUBLICATIONS

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**Norris, J. and Turner, A.** *Weak convergence of the localized disturbance flow to the coalescing Brownian flow.* *Annals of Probability* **43** (3) 935-970, 2015. Available at <http://arxiv.org/abs/1106.3252>.

**Turner, A. and Whitehead, J.** *Partial stochastic dominance for the multivariate Gaussian distribution.* *Statistics and Probability Letters* **103** pp80-85, 2015. Available at <http://arxiv.org/abs/1407.0936>.

**Whitehead, J., Cleary, F. and Turner, A.** *Bayesian sample sizes for exploratory clinical trials comparing multiple experimental treatments with a control.* *Statistics in Medicine* **34** (12) 2048-2061, 2015. Available at <http://arxiv.org/abs/1408.6211>.

**Johansson Viklund, F., Sola, A. and Turner, A.** *Small-particle limits in a regularized Laplacian random growth model.* *Communications in Mathematical Physics* **334** (1) 331-366, 2015. Available at <http://arxiv.org/abs/1309.2194>.

**Norris, J. and Turner, A.** *Hastings-Levitov aggregation in the small-particle limit.* *Communications in Mathematical Physics* **316** pp809-841, 2012. Available at <http://arxiv.org/abs/1106.3546>.

**Johansson Viklund, F., Sola, A. and Turner, A.** *Scaling limits of anisotropic Hastings-Levitov clusters.* *Annales de l'Institut Henri Poincaré - Probabilités et Statistiques* **48** (1) pp235-257, 2012. Available at <http://arxiv.org/abs/0908.0086>.

**Norris, J. and Turner, A.** *Planar aggregation and the coalescing Brownian flow.* arXiv:0810.0211 [math.PR], 2009 (39 pages).

**Turner, A.** *Planar aggregation and the Brownian web.* *Proceedings of the 16th European Young Statisticians Meeting* pp93-97, 2009.

**Mosbach, S. and Turner, A.** *A quantitative investigation into the accumulation of rounding errors when solving ODEs numerically.* *Computers and Mathematics with Applications* **57** (7) pp1157-1167, 2009. Available at <http://arxiv.org/abs/math.NA/0512364>.

**Turner, A.** *Convergence of Markov processes near saddle fixed points.* *Annals of Probability* **35** pp1141-1171, 2007. Available at <http://arxiv.org/abs/math.PR/0412051>.

**Turner, A.** *Scaling Limits of Stochastic Processes.* PhD thesis. September 2006. Available at <http://www.maths.lancs.ac.uk/~turnera/thesis.pdf>.

**Turner, A.** *Convergence of Markov processes.* Essay for Certificate of Advanced Study in Mathematics, 2002. Available at <http://www.maths.lancs.ac.uk/~turnera/essay.pdf>.

## CONFERENCE AND SEMINAR PRESENTATIONS

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| April 2015 | <b>ICERM workshop on Limit Shapes</b> , Brown University, Providence, Rhode Island, USA.     |
| March 2015 | <b>Random Graphs, Random Trees and Applications</b> , Isaac Newton Institute, Cambridge, UK. |
| Feb 2015   | <b>Probability workshop</b> , University of Oxford, UK.                                      |
| Nov 2014   | <b>Probability and Statistics Seminar</b> , University of Manchester, UK.                    |
| Oct 2014   | <b>Probability and Statistics Seminar</b> , University of Bristol, UK.                       |

- June 2014 **44<sup>th</sup> Annual John H. Barrett Memorial Lectures**, University of Tennessee, Knoxville, USA.
- March 2014 **Prob-L@B (Probability Laboratory at Bath) Seminar**, University of Bath, UK.
- Feb 2014 **CRISM (Centre for Research in Statistical Methodology) Seminar**, University of Warwick, UK.
- Nov 2013 **Stochastic Analysis Seminar**, Imperial College London, UK.
- Sept 2013 **Beauty in Science Public Lecture**, Storey Institute, Lancaster, UK.
- July 2013 **Conference on Stochastic Processes and their Applications (SPA)**, Boulder Colorado, USA.
- July 2013 **Women in Probability Workshop**, Technische Universität München, Germany.
- March 2013 **BMC (British Mathematical Colloquium)**, University of Sheffield, UK.
- Oct 2012 **RSS Applied Probability Section Meeting**, RSS London, UK (Chair and organiser).
- March 2012 **UK Easter Probability Meeting**, University of Warwick, UK.
- Jan 2012 **Stat-Math Seminar**, Indian Statistical Institute (ISI), Delhi, India.
- Dec 2011 **Complex Analysis and Integrable Systems**, Mittag-Leffler Institute, Sweden.
- Sept 2011 **Networks: stochastic models for populations and epidemics**, ICMS, Edinburgh, UK.
- April 2011 **LMS Short Course**, University of Oxford, UK.
- April 2010 **Analysis Seminar**, KTH, Stockholm, Sweden.
- Feb 2010 **Statistics Division Seminar**, University of Nottingham, UK.
- Nov 2009 **Dynamical Systems and Statistical Physics seminar**, Queen Mary, University of London, UK.
- Nov 2009 **Statistics Forum**, Lancaster University, UK.
- Sept 2009 **New Random Geometries and Other Recent Developments in Probability**, University of Bath, UK.
- Aug 2009 **European Young Statisticians Meeting (EYSM)**, Bucharest, Romania.
- June 2009 **Annual Meeting of the Statistical Society of Canada**, Vancouver, Canada.
- Feb 2009 **Probability Seminar Series**, Heriot-Watt University, UK.
- Feb 2009 **Aggregation, condensation and coagulation in particle systems**, University of Warwick, UK.
- Jan 2009 **Potential Theory and Analysis of Growth Processes**, Université d'Orléans, France.
- Jan 2009 **Statistical Mechanics Seminar Series**, University of Warwick, UK.
- Sept 2008 **Phenomena in High Dimensions**, Lancaster University, UK.
- July 2008 **World Congress in Probability and Statistics**, Singapore.
- April 2008 **SPINADA (Systemes de Particules en Interactions Non réversibles – Approches Déterministes et Aléatoires) Workshop**, Paris, France.
- April 2008 **Probability 2008**, University of Warwick, UK.
- Oct 2007 **Stochastic Analysis Seminar Series**, University of Warwick, UK.
- April 2007 **Stochastic Analysis Seminar Series**, University of Oxford, UK.
- April 2007 **BMC (British Mathematical Colloquium)**, University of Swansea, UK.
- March 2007 **Probability Seminar Series**, Statistical Laboratory, University of Cambridge, UK.
- Nov 2006 **Seminar Series on Discrete and Applicable Mathematics**, Centre for Discrete and Applicable Mathematics, London School of Economics, UK.
- Oct 2006 **Complex Analysis Seminar Series**, Department of Pure Mathematics and Mathematical Statistics, University of Cambridge, UK.
- Sept 2006 **LMS Workshop**, University of Bath, UK.
- June 2005 **LMS Short Course**, Swansea University, UK.
- July 2004 **World Congress in Probability and Statistics**, Barcelona, Spain.
- April 2004 **2004 Research Students Conference in Probability and Statistics**, University of Sheffield, UK.
- July 2003 **33<sup>rd</sup> Saint-Flour Probability Summer School**, Saint-Flour, France.
- 2002 – 2006 **Graduate Seminar Series**, Statistical Laboratory, University of Cambridge, UK.