

# Curriculum vitae

*Lecturer*

Dept of Mathematics and Statistics  
University of Reading

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## Research interests

- rare event statistics
  - rare event simulation
  - tipping points & rare transitions
  - extreme value theory
- non-equilibrium statistical mechanics & dynamical systems
  - response theory
  - large deviation theory
  - stochastic limit laws (homogenization)
- mathematical physics

## Education

2006-2010 *PhD in Theoretical Physics*, KU Leuven, Belgium  
Thesis title: “Quantum Hidden Markov Chains”  
under supervision of Prof. Mark Fannes

2004-2005 *Master in Medical Imaging (magna cum laude)*, KU Leuven, Belgium

2000-2004 *Candidate (magna cum laude) and Licenciante (cum laude) in Physics*, KU Leuven, Belgium  
Thesis title: “Antisymmetric tensors in minimal 4-dimensional supersymmetry”  
under supervision of Prof. Antoine Van Proeyen

## Employment

11/2018 → present *Lecturer*  
Department of Mathematics and Statistics, University of Reading, UK

03/2018 → 10/2018 *Postdoctoral research fellow*  
Niels Bohr Institute, University of Copenhagen, DK

03/2015 → 02/2018 *Marie Curie research fellow*  
Department of Mathematics and Statistics, University of Reading, UK  
School of Mathematics and Statistics, University of Sydney, Australia

03/2014 → 02/2015 *AXA postdoctoral research fellow*  
Laboratoire de Physique, Ecole Normale Supérieure de Lyon, France

01/2011 → 02/2014 *Postdoctoral research fellow*  
Meteorological Institute, Universität Hamburg, Germany  
School of Mathematics, University of Reading, UK

01/2006 → 09/2006 *Researcher*  
Medical Imaging Research Center, KU Leuven, Belgium

## Research funding obtained

2015-2018 € 274k Marie Curie International Outgoing Fellowship (96.5% score)

2014-2016 € 120k Post-Doctoral Fellowship of the AXA Research Fund

2014 € 34k DFG Grant to Support the Initiation of International Collaboration

## Publications

17 peer-reviewed journal articles, 4 articles in conference proceedings, 2 book chapter

### Journal articles

1. "Stochastic Model Reduction for Slow-Fast Systems with Moderate Time Scale Separation"  
J. Wouters, G. Gottwald arXiv: 1804.09537  
*Multiscale Modeling & Simulation* (2019) doi: 10.1137/18M1219965
2. "Computation of extreme heat waves in climate models using a large deviation algorithm"  
F. Ragone, J. Wouters, F. Bouchet arXiv: 1709.03757  
*PNAS* (2018) doi: 10.1073/pnas.1712645115
3. "Response formulae for  $n$ -point correlations in statistical mechanical systems and application to a problem of coarse graining"  
V. Lucarini, J. Wouters arXiv: 1702.02666  
*Journal of Physics A* (2017) 50 355003 doi: 10.1088/1751-8121/aa812c
4. "Parametrization of stochastic multilevel triads"  
J. Wouters, S. Dolaptchiev, U. Achatz, V. Lucarini npg-2016-37  
*Nonlinear Processes in Geophysics* (2016) 23, 435-445 doi: 10.5194/npg-23-435-2016
5. "Rare event computation in deterministic chaotic systems using genealogical particle analysis"  
J. Wouters, F. Bouchet arXiv: 1511.02703  
*Journal of Physics A* (2016) 49, 374002 doi: 10.1088/1751-8113/49/37/374002
6. "On spurious detection of linear response and misuse of the fluctuation-dissipation theorem in finite time series"  
G.A. Gottwald a , C. Wormell, J. Wouters arXiv: 1601.03112  
*Physica D* (2016) 331, 89 - 101 doi: 10.1016/j.physd.2016.05.010
7. "Mathematical and Physical Ideas for Climate Science"  
V. Lucarini, R. Blender, C. Herbert , F. Ragone, S. Pascale, J. Wouters arXiv: 1311.1190  
*Reviews of Geophysics* (2014) 52, 809–859 doi: 10.1002/2013RG000446
8. "On using Extreme Values to detect global stability thresholds in multi-stable systems: The case of transitional plane Couette flow"  
D. Faranda, V. Lucarini, P. Manneville, J. Wouters arXiv: 1211.0510  
*Chaos, Solitons & Fractals* (2014) 64, 26–35 doi: 10.1016/j.chaos.2014.01.008
9. "Towards a General Theory of Extremes for Observables of Chaotic Dynamical Systems"  
V. Lucarini, D. Faranda, J. Wouters, T. Kuna arXiv: 1301.0733  
*J. Stat. Phys.* (2014) 154, 3, 723-750 doi: 10.1007/s10955-013-0914-6
10. "Avalanches, Breathers and Flow Reversal in a Continuous Lorenz-96 Model"  
R. Blender, J. Wouters, V. Lucarini arXiv: 1301.5801  
*Phys. Rev. E* (2013) 88, 013201 doi: 10.1103/PhysRevE.88.013201
11. "Towards a Fluctuation Theorem in an Atmospheric Circulation Model"  
B. Schalge, R. Blender, J. Wouters, K. Fraedrich, F. Lunkeit arXiv: 1211.1181  
*Phys. Rev. E* (2013) 87, 7, 052113 doi: 10.1103/PhysRevE.87.052113
12. "Multi-level Dynamical Systems: Connecting the Ruelle Response Theory and the Mori-Zwanzig Approach"  
J. Wouters, V. Lucarini arXiv: 1208.3080  
*J. Stat. Phys.* (2013) 151, 5, 850-860 doi: 10.1007/s10955-013-0726-8
13. "Universal Behaviour of Extreme Value Statistics for Selected Observables of Dynamical Systems"  
V. Lucarini, D. Faranda, J. Wouters arXiv: 1110.0176  
*J. Stat. Phys.* (2012) 147, 1, 63-73 doi: 10.1007/s10955-012-0468-z
14. "Disentangling multi-level systems: averaging, correlations and memory"  
J. Wouters, V. Lucarini arXiv: 1110.6113  
*J. Stat. Mech.* (2012) P03003 doi: 10.1088/1742-5468/2012/03/P03003
15. "Relevance of sampling schemes in light of Ruelle's linear response theory"  
V. Lucarini, T. Kuna, J. Wouters, D. Faranda arXiv: 1105.2527  
*Nonlinearity* (2011) 25, 1311 doi: 10.1088/0951-7715/25/5/1311
16. "Correlations in Free Fermionic States"  
M. Fannes, J. Wouters arXiv: 0906.3196  
*J. Phys. A: Math. Theor.* (2009) 42, 465308 doi: 10.1088/1751-8113/42/46/465308
17. "Classical capacity of a qubit depolarizing channel with memory"  
J. Wouters, I. Akhalya, M. Fannes, F. Petruccione arXiv: 0901.2516  
*Phys. Rev. A* (2009) 79, 042303 doi: 10.1103/PhysRevA.79.042303

## Proceedings and book chapters

1. "Parametrization of Cross-scale Interaction in Multiscale Systems"  
J. Wouters, V. Lucarini  
Chapter in "*Climate Change: Multidecadal and Beyond*" (2015), pp. 67-80, World Scientific
2. "Quantum Processes"  
M. Fannes, J. Wouters arXiv: 1005.3177  
Chapter in "*Quantum dynamics and information*" (2010), pp. 59-78, World Scientific
3. "Correlations in Free Fermionic Systems"  
M. Fannes, J. Wouters  
*Proc. "New Perspectives in Quantum Statistics and Correlations"* (2010)
4. "The Algebraic Measure of a Hidden Markov Quantum Memory Channel"  
I. Akhalwaya, J. Wouters, M. Fannes, F. Petruccione arXiv: 0901.2528  
*AIP Conf. Proc.* (2009) 1110, 127-130 doi: 10.1063/1.3131288
5. "Non-rigid image registration using mutual information"  
F. Maes, E. D'Agostino, D. Loeckx, J. Wouters, D. Vandermeulen, P. Suetens  
*Proc. Compstat 2006* (2006) 91-103 doi: 10.1007/978-3-7908-1709-6\_8
6. "Non-rigid brain image registration using a statistical deformation model"  
J. Wouters, E. D'Agostino, F. Maes, D. Vandermeulen, P. Suetens  
*Proc. SPIE* (2006) 6144, 614411 doi: 10.1117/12.653081

## Teaching experience

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| 2016      | lecturing of MATH1001 "Differential Calculus" at the University of Sydney  |
| 2016      | participant in the "Principles and Practice of University Teaching and Learning Program" at the University of Sydney |
| 2016      | participant in the "Peer Review of Teaching" program of the Science Faculty at the University of Sydney              |
| 2015      | co-supervision of Honours student C. Wormell (Sydney)  |
| 2013      | lecturing of a mini-course on chaotic dynamical systems to the Master in Integrated Climate System Science (Hamburg) |
| 2011-2013 | co-supervision of two PhD students (D. Faranda and S. Schubert, Hamburg)   |
| 2010      | supervision of a master student project on entanglement dynamics   |
| 2009      | supervision of a bachelor student project on bioinformatics  |
| 2009      | teaching assistant for biophysics lab sessions   |
| 2008-2009 | teaching assistant for differential equations exercise sessions  |
| 2007-2008 | teaching assistant for differential equations exercise sessions  |
| 2006-2007 | teaching assistant for biophysics exercise sessions  |

## Meeting organisation, speaking and visiting invitations

- 02/2019 *Workshop organiser* at Les Houches  
 04/2018 *Session co-convenor* at the European Geosciences Union General Assembly  
 04/2018 *Invited oral presentation*, “54rd Dutch Mathematical Congress”, Utrecht, Netherlands  
 09/2017 *Invited oral presentation*, “StochClim meeting”, Brussels, Belgium  
 08/2017 *Invited oral presentation*, “CliMathNet conference”, Reading, UK  
 05/2017 *Seminar talk* at CWI, Amsterdam, Netherlands  
 04/2017 *Seminar talk* at Royal Meteorological Institute, Brussels, Belgium  
 03/2017 *Invited oral presentation*,  
 “Scaling cascades in complex systems”, Berlin, Germany  
 10/2015 *Discussion group organiser*,  
 “Applied maths in Science & Engineering”, Sydney, Australia  
 06/2014 *Workshop organiser*,  
 “Instabilities and Fluctuations of Geophysical Flows”, Hamburg, Germany  
 02/2014 *Research visit*, Institute for Numerical Mathematics, Moscow, Russia  
 11/2013 *Research stay*, Isaac Newton Institute, Cambridge, UK  
 11/2013 *Invited oral presentation*,  
 “Mathematics for the Fluid Earth” workshop, Isaac Newton Institute, Cambridge, UK  
 9/2013 *Invited oral presentation*,  
 “Stochastic Parameterisation in Weather and Climate Models”,  
 University of Bonn, Bonn, Germany  
 5/2013 *Research visit* with Freddy Bouchet, ENS, Lyon, France  
 11/2012 *Invited oral presentation*  
 for Theoretical Meteorology group seminar, Frankfurt, German  
 5-6/2008 *Research stay* with Robert Alicki, University of Gdańsk, Poland

## Public outreach activities

2014. Scientific support for the “Fête de la Science” (“Science Fest”) in Lyon, F  
 2009. Presentation for high school students for the “Wetenschapsweek” (“Science week”), Leuven, B  
 2008. Presentation for high school students for the “Wetenschapsweek” (“Science week”), Leuven, B

## Other skills

### Computer skills

Programming and scripting languages: Bash, C, C++, Fortran, Julia, Matlab/Octave, Python  
 Mathematical software: SageMath, Numpy, Matplotlib,  $\LaTeX$ ,  $\TeX$ <sub>macs</sub>  
 Operating systems: Linux, Mac OS X

### Language skills

Dutch: mother tongue  
 English: fluent  
 French: proficient  
 German: proficient  
 Russian: conversant