Ole B. Peters

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BORN 09 October 1978 in Hamburg, Germany.

LANGUAGES
Fluent: English, German.
Conversational: French.

RESEARCH INTERESTS
Statistical mechanics, ergodic theory, stochastic processes, non-equilibrium critical phenomena, self-organized systems, atmospheric dynamics, economics, finance.

Scientific Vita

My Ph.D. work dealt with self-organized critical systems, which self-tune to critical states in their phase spaces, where order and spatio-temporal structure emerge. These systems are interesting because they operate on the "edge of chaos", where predictability is limited due to diverging susceptibility to perturbations. I later applied this theoretical work in statistical mechanics to atmospheric dynamics and climatology. Since 2007 I have held a visiting position at UCLA's Atmospheric and Oceanic Sciences department.

In 2007 I started working on the concepts and historical development surrounding randomness, in particular ergodicity and how this late-19th century concept can inform economic theory. In 2010 I founded the R&D firm ZONlab ltd. that translates my theoretical work into practical applications. Most of ZONlab's business is in the field of risk management.

In 2012 I co-founded the London Mathematical Laboratory (LML) for basic science. LML currently employs three full-time resident fellows, and has three external fellows and a board of four trustees. It is funded purely through philanthropy, the idea being to provide an environment for curiosity-driven scientific research.

Since 2013 I have been an external professor at the Santa Fe Institute.

CURRENT POSITIONS

2013–present **Santa Fe Institute**, Santa Fe, USA.
  External Professor.

2012–present **London Mathematical Laboratory**, London, UK.
  Fellow.

2010–present **ZONlab ltd.**, London, UK.
  Director.

2007–present **Department of Atmospheric and Oceanic Sciences, UCLA**, LA, USA.
  Visiting Scientist.

POSTDOCTORAL RESEARCH

Imperial College London, Dept. of Mathematics, UK.
  2009 - 2012: Research Associate.

Los Alamos National Laboratory, Center for Nonlinear Studies, Los Alamos, USA.
  2004 - 2006: Postdoctoral Research Associate.

Santa Fe Institute, Santa Fe, USA.

2004 - 2006: Postdoctoral Fellow.

EDUCATION **Imperial College London**, London, UK.
2001 - 2004: Ph.D., Condensed Matter Theory Group, Physics Department.
Supervisor: Kim Christensen.

1998 - 2001: BSc, Physics, 1st class honours.

Christianeum and **Goethe Gymnasium**, Hamburg, Germany.
1989 - 1997: Abitur, average mark 1.0.

TEACHING **Institute for Pure and Applied Mathematics**, UCLA, USA.
2010: "Stochastic Processes for Complex Systems".

Max-Plack Institute for Meteorology, Hamburg, Germany.
2009: "Stochastic Processes for Complex Systems", International Max-Planck Research School.

Santa Fe Institute, Santa Fe, USA.
2013: Non-ergodic economics. Complex Systems Summer School.
2012: Non-ergodic economics. Complex Systems Summer School.
2005: An overview of self-organized criticality. Complex Systems Summer School.

Imperial College London, London, UK.
2002 and 2003: Supplementary lectures to a course in statistical mechanics for 3rd and 4th year undergraduate physics students.

PUBLICATIONS

SUBMITTED [22] O. Peters and M. Gell-Mann,
Evaluating gambles using dynamics.
SFI working paper # 14-05-013 (2014).

[21] O. Peters,
Menger 1934 revisisted.
http://arxiv.org/abs/1110.1578 (2011).

[20] O. Peters and A. Adamou,
Stochastic Market Efficiency.
SFI working paper # 13-06-022 (2013)
http://arxiv.org/abs/1101.4548 (2011).

[19] O. Peters and G. Pruessner,
Tuning- and order parameter in the SOC ensemble.
http://arxiv.org/abs/0912.2305 (2009).

PEER-REVIEWED [18] O. Peters and W. Klein,
Ergodicity breaking in geometric Brownian motion.
Phys. Rev. Lett. **110**, 100603 (2013)
doi:10.1103/PhysRevLett.110.100603

[17] O. Peters, K. Christensen and D. Neelin,
Rainfall and dragon-kings.
Eur. Phys. J. Special Topics **205**, 147–158 (2012).
doi:10.1140/epjst/e2012-1567-5

[16] O. Peters,
The time resolution of the St. Petersburg paradox.
Phil. Trans. R. Soc. A **369**, 1956, 4913–4931 (2011).
doi:10.1098/rsta.2011.0065

[15] O. Peters,
Optimal leverage from non-ergodicity.
Quant. Fin. **11**, 1593–1602 (2011).
doi:10.1080/14697688.2010.513338

[14] O. Peters, A. Deluca, A. Corral, D. Neelin and C. Holloway,
Universality of rain event size distributions.
J. Stat. Mech. P11030 (2010).
doi:10.1088/1742-5468/2010/11/P11030

[13] O. Peters and M. Girvan
Universality under conditions of self-tuning.
J. Stat. Phys. **141**, 1, 53–59 (2010).
doi:10.1007/s10955-010-0039-0

[12] J. D. Neelin, O. Peters, J. W.-B. Lin, K. Hales and C. Holloway, in "Stochastic Physics and Climate Modelling:, eds. T. Palmer and P. Williams, Cambridge University Press (2010), Ch. 16.
Rethinking convective quasi-equilibrium: observational constraints for stochastic convective schemes in climate models.
doi:10.1098/rsta.2008.0056

[11] O. Peters and D. Neelin,
Atmospheric convection as a continuous phase transition: further evidence.
Int. J. Mod. Phys. B **23**, 28–29, 5453–5465 (2009).
doi:10.1142/S0217979209063778

[10] O. Peters, J. D. Neelin and S. Nesbitt
Mesoscale convective systems and critical clusters.
J. Atmos. Sci. **66**, 9, 2912–2924 (2009).
doi: 10.1175/2008JAS2761.1

[9] D. Neelin, O. Peters and K. Hales
The transition to strong convection.
J. Atmos. Sci. **66**, 8, 2367–2384 (2009).
doi: 10.1175/2009JAS2962.1

[8] J. D. Neelin, O. Peters, J. W.-B. Lin, K. Hales and C. Holloway,
Rethinking convective quasi-equilibrium: observational constraints for stochastic convective schemes in climate models.
Phil. Trans. R. Soc. A **366**, 2581–2604 (2008).
doi:10.1098/rsta.2008.0056

[7] G. Pruessner and O. Peters,
Reply to "Comment on 'Self-organized criticality and absorbing states: Lessons from the Ising model' ".
Phys. Rev. E **77**, 048102 (2008).
doi:10.1103/PhysRevE.77.048102

[6] O. Peters and D. Neelin,

Critical Phenomena in Atmospheric Precipitation.
Nature Physics **2**, 393-396 (2006).
doi: 0.1038/Nphys314

[5] G. Pruessner and O. Peters,
Self-Organized Criticality and Absorbing States: Lessons from the Ising model.
Phys. Rev. E **73**, 025106(R) (2006).
doi: 10.1103/PhysRevE.73.025106

[4] O. Peters and K. Christensen,
Rain Viewed as Relaxational Events.
J. Hydrol. **328**, 46-55(2006).
doi:10.1016/j.hydrol.2005.11.045

[3] Avalanche behaviour in an Absorbing State Oslo Model.
Phys. Rev. E **70**, 067101(R) (2004).
doi: 10.1103/PhysRevE.70.067101

[2] Rain: Relaxations in the Sky.
Phys. Rev. E **66**, 036120 (2002).
doi: 10.1103/PhysRevE.66.036120

[1] O. Peters, C. Hertlein, and K. Christensen,
A complexity view of rainfall.
Phys. Rev. Lett. **88**, 018701 (2002).
doi: 10.1103/PhysRevLett.88.01871

CONFERENCE PROCEEDINGS	O. Peters and K. Christensen, Micro Rain Measurements reveal evidence of self-organised criticality in precipitation processes. 6th International Symposium for Tropospheric Profiling, 312-314 (2003). Institute for Tropospheric Research, Leipzig.
COMPUTING	**C, Unix environment**: Monte Carlo simulations and data analysis of equilibrium and non-equilibrium statistical mechanics models, focusing on continuous phase transitions.
	Matlab: Programming for analysis of geophysical and financial data sets.