

Nonlinearities - from Turbulent to Magic

Wed 17 - Sat 20 May 2006, Copenhagen, Denmark

Sponsors: **NORDITA**, **BioNET** and **Niels Bohr Fond**; **Nonlinearity**

Themes: The workshop focuses on recent advances in physics of complex systems, classical chaos and turbulence, wave and quantum chaos, and much exceptional magic beyond.

Speakers: E Aurell, V Baladi, M V Berry, E Bogomolny, T Bohr, A de Carvalho, A de Wijn, C P Dettmann, B Eckhardt, J-P Eckmann, C Ellegaard, M J Feigenbaum, H Fogedby, T Geisel, P Grassberger, G Gunaratne, F Haake, A G Jackson, J Keating, H Kohler, U Kuhl, P Muratore Ginanneschi, S Nonnenmacher, M Oxborrow, M Paczuski, R Penrose, J Parrondo, M Porter, I Procaccia, A Richter, U Smilansky, N Sondergaard, E A Spiegel, L Tuckerman, F Waleffe, A Wirzba

Scientific direction: B Lautrup (chair), G Tanner (co-chair), P Cvitanović, A Brandenburg, M H Jensen, R Artuso, S Creagh, T Guhr, G Huber, H-H Rugh. **Artistic direction:** P Cvitanović.

Registrations, with a brief description of research interests should be entered into the [conference website](#) before **1 April 2006**. Junior researchers applying for partial support should also arrange for letter(s) of reference. For information please contact:

Secretary: **Hanne Christensen**, Niels Bohr Institute, Blegdamsvej 17, DK - 2100 Copenhagen Ø
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Nonlinearities '06 - Nordita and Niels Bohr Institute Thematic Workshop

Program

Wednesday, May 17

8:30-8:55 **Registration**

Chair: **Benny Lautrup**

9:00-9:25 **Andreas Wirzba** Casimir effect and trace formula

9:30-9:55 **Clive Ellegaard** Development in Acoustic Chaos

10:00-10:25 **Niels Søndergaard** Wave chaos in elastodynamics

Refreshments

Chair: **Thomas Guhr**

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|-------------|------------------------------|--|
| 11:00-11:25 | Achim Richter | Superscars and Nodal Domains in the Barrier Billiard |
| 11:30-11:55 | Eugene Bogomolny | SLE and nodal lines |
| 12:00-12:25 | Ulrich Kuhl | Flow structures in open microwave cavities |
| 12:30-12:55 | Stéphane Nonnenmacher | Resonances and resonant states in chaotic scattering |

Lunch

Chair: **Stephen Creagh**

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|-------------|-------------------------|---|
| 14:30-14:55 | Michael V. Berry | Conical diffraction: imaging Hamilton's diabolical point |
| 15:00-15:25 | Fritz Haake | Semiclassical theory of universal spectral statistics and transport |
| 15:30-15:55 | Mark Oxborrow | Clocks based on Quantum Chaos (Temporal Order Out Of)? |

Refreshments

Chair: **Chris Pethick**

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|-------------|---------------------|---|
| 16:30-16:55 | Mason Porter | Bose-Einstein Condensates in Optical Lattices and Superlattices |
| 17:00-17:25 | Andy Jackson | <i>Anaesthetics without pain</i> |

20:00 *Zappa plays Zappa, Falkoner Salen (not part of the workshop)*

Thursday, May 18

Chair: **Mogens H. Jensen**

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|-------------|-----------------------|---|
| 9:00-9:25 | Erik Aurell | Heuristics for satisfiability problems |
| 9:30-9:55 | Astrid de Wijn | Analytical Lyapunov spectra of high-dimensional billiards |
| 10:00-10:25 | Maya Paczuski | Turbulence and networks on the earth and elsewhere |

Refreshments

Chair: **John Hertz**

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|-------------|----------------------------|--|
| 11:00-11:25 | Peter Grassberger | Mutual information: from phylogenetic trees to spectral analysis |
| 11:30-11:55 | Hans Fogedby | Growth and Pattern Formation in the KPZ equation |
| 12:00-12:25 | Jean-Pierre Eckmann | Billiards as heat conductors |
| 12:30-12:55 | Gemunu Gunaratne | Scaling Distributions and Variable Step Random Walks |

Lunch

Chair: **Roberto Artuso**

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|-------------|----------------------|-------------------------------------|
| 14:30-14:55 | Roger Penrose | An idea for Quantum State Reduction |
| 15:00-15:25 | Juan Parrondo | Randomness and paradoxes |
| 15:30-15:55 | Uzy Smilansky | Can one count the shape of a drum? |

Refreshments

Chair: **Dwight Barkley**

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|-------------|-------------------------|--|
| 16:30-16:55 | Theo Geisel | The Scaling Laws of Human Travel - Anomalous Diffusion in Epidemiology |
| 17:00-17:25 | Itamar Procaccia | Exact Mapping of Nonlinear Turbulence to Linear Models: The Mechanism of Anomalous Scaling |

19:30 *Workshop dinner at Spisehuset (Magstræde 12, upstairs, below the cinema)*

Friday, May 19

Chair: **Hans Henrik Rugh**

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|-------------|--------------------------|--|
| 9:00-9:25 | Viviane Baladi | Ruelle determinants and spectrum for hyperbolic systems: a Paley-Littlewood approach |
| 9:30-9:55 | Andre de Carvalho | Pruning and infinitely renormalizable Henon maps |
| 10:00-10:25 | Carl P. Dettmann | Open circular billiards and the Riemann Hypothesis |

Refreshments

Chair: **Greg Huber**

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|-------------|-----------------------------------|--|
| 11:00-11:25 | Jonathan Keating | Symmetry's reach |
| 11:30-11:55 | Predrag Cvitanović | Exceptional magic (a construction of exceptional Lie algebras) |
| 12:00-12:25 | Heiner Kohler | Many family CMS systems and supersymmetry |
| 12:30-12:55 | Paolo Muratore Ginanneschi | Inverse (infra-red) renormalisation group for turbulence |

Lunch

Chair: **Axel Brandenburg**

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|-------------|--|---|
| 14:30-14:55 | Laurette Tuckerman [and Dwight Barkley] | Can your turbulence theory explain this pattern? |
| 15:00-15:25 | Fabian Waleffe | The coherence of shear turbulence: self-sustaining process and exact coherent structure |
| 15:30-15:55 | Bruno Eckhardt | Magic saddles: from quantum chaos to pipe flow |

Refreshments

Chair: **Gregor Tanner**

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|-------------|--------------------------|---|
| 16:30-16:55 | Edward A. Spiegel | Large-Scale Patterns in Thermal Convection |
| 17:00-17:25 | Tomas Bohr | The rise and fall of the sap. Complex fluid dynamics in trees |
| 17:30 | <> | tak og farvel: end of the scientific programme |

Saturday, May 20: lectures for general public