

# 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  
[www.cats.nbi.dk](http://www.cats.nbi.dk) / Tel: +45:35 32 52 60 / Fax: +45:35 32 52 17 / [cats \[ at \] nbi.dk](mailto:cats[at]nbi.dk)

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

*Lunch*

Chair: **Stephen Creagh**

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

*Refreshments*

Chair: **Chris Pethick**

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|-------------|---------------------|---|
| 16:30-16:55 | <b>Mason Porter</b> | Bose-Einstein Condensates in Optical Lattices and Superlattices |
| 17:00-17:25 | <b>Andy Jackson</b> | <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   | <b>Erik Aurell</b>    | Heuristics for satisfiability problems                    |
| 9:30-9:55   | <b>Astrid de Wijn</b> | Analytical Lyapunov spectra of high-dimensional billiards |
| 10:00-10:25 | <b>Maya Paczuski</b>  | Turbulence and networks on the earth and elsewhere        |

*Refreshments*

Chair: **John Hertz**

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

*Lunch*

Chair: **Roberto Artuso**

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

*Refreshments*

Chair: **Dwight Barkley**

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|-------------|-------------------------|--|
| 16:30-16:55 | <b>Theo Geisel</b>      | The Scaling Laws of Human Travel - Anomalous Diffusion in Epidemiology                     |
| 17:00-17:25 | <b>Itamar Procaccia</b> | 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   | <b>Viviane Baladi</b>    | Ruelle determinants and spectrum for hyperbolic systems: a Paley-Littlewood approach |
| 9:30-9:55   | <b>Andre de Carvalho</b> | Pruning and infinitely renormalizable Henon maps                                     |
| 10:00-10:25 | <b>Carl P. Dettmann</b>  | Open circular billiards and the Riemann Hypothesis                                   |

*Refreshments*

Chair: **Greg Huber**

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

*Lunch*

Chair: **Axel Brandenburg**

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

*Refreshments*

Chair: **Gregor Tanner**

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|-------------|--------------------------|---|
| 16:30-16:55 | <b>Edward A. Spiegel</b> | Large-Scale Patterns in Thermal Convection                    |
| 17:00-17:25 | <b>Tomas Bohr</b>        | 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