MaPhySto News

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THIS ISSUE

INTRODUCTION

Welcome to the third issue of MAPHYSTO NEWS.

As you will see from the reports below, it has been a busy spring term for MaPhySto. Several workshops and courses have been held and as of this writing the *Summer School on Empirical Processes* is taking place.

Again in this issue, some of the reports are authored by the participants themselves. We do very much appreciate the feed-back we receive in this manner and we welcome future contributions to MAPHYSTO NEWS.

New readers who may not yet be acquainted with the Centre, may find some general information about MaPhySto at the end of the newsletter.

Ole E. Barndorff-Nielsen,
Søren Have Hansen, eds.

RECENT EVENTS

Concentrated Advanced Course on Stochastic Simulation.

Report by Bo Markussen and Martin Richter.

In the week February 22-26, 1999, a concentrated advanced course on stochastic simulation was held at the Department of Mathematical Sciences, University of Aarhus. In the morning sessions lectures were given by professor *Søren Asmussen* from the University of Lund and in the afternoons the participants had the opportunity to carry out experiments in computer sessions supervised by *Sofia Andersson*, also from Lund. The 33 participants from 5 different countries had a wide spectrum of motivations for joining the course, from applications in applied problems to interest in theoretical issues. Søren Asmussen covered successfully this wide range of aspects in the subject of stochastic simulation. For the course Søren Asmussen had written lecture notes which have appeared in the MaPhySto Lecture Notes series. The notes, which include a comprehensive bibliography, will serve as an excellent starting point for anyone working with stochastic simulation.

Workshop on Inverse Problems in Stratified Media. This was the first workshop within the activities in inverse problems. The workshop was held in Aarhus April 22-24 and had 35 participants. The workshop brought together researchers with varied background, ranging from pure mathematics to researchers collecting data in the field. *Michael Thompson* (Queen Mary and Westfield College) opened the workshop with lectures on helioseismology talking on inferring the structure of the inside of the Sun from oscillations in the surface.

FIGURE 1. Most of the participants of the course on Stochastic Simulation.

Eric Clévédé (Département de Seismologie, Paris) talked on understanding the interior of the Earth, instead, from seismic activity. He talked about the model used to describe the Earth and problems related to the distribution of seismometers. *Delphine Sinoquet* (Institut Francais du Petrole) also discussed investigations of the Earth with applications to oil exploration. The data she discussed were travel times for seismic waves and how to use these to get velocities and geometry of the reflector system. *Peter Weidelt* (TU Braunschweig) in his first presentation talked about "a training site for the mathematical geophysicist". The problem is to infer the electrical conductivity distribution inside the Earth from measurements of the electromagnetic surface impedance. In his second talk, instead of looking at the traditional inverse problem of determining an estimate of the model, *Peter Weidelt* considered the problem of putting bounds on parameters in the model from the data. *Adrian Nachman* (Rochester) gave an overview of mathematical results in multidimensional inverse problems concentrating on inverse boundary problems. In his first talk he emphasized the connections between different inverse problems and in his second talk he discussed an exact,

non-iterative inversion method. *James Ralston* (UCLA) talked on inverse scattering at fixed energy for the acoustic wave equation in a layered medium. In these problems the scattering amplitude is given and one wishes to recover coefficients in the wave equation. He also presented results on the direct problem, using Gaussian beams. *Volker Enss* (Institut für Reine und Angewandte Mathematik, RWTH Aachen) together with *Wolf Jung* spoke on a geometrical approach to inverse scattering. The Schrödinger and the Klein-Gordon equations were considered and uniqueness results, limit behaviour and reconstruction formulas were all discussed.

A booklet containing the workshop programme, extended abstracts of (most of) the talks and a list of participants has appeared in the MaPhySto Miscellanea series. The workshop was organized by *Jens Ledet Jensen, Arne Jensen* (MaPhySto), *Bo Holm-Jacobsen* (Department of Earth Sciences, University of Aarhus) and *Jean-Claude Guillot* (Université Paris-Nord), and MaPhySto wishes to extend a special thanks to the latter two for taking upon them this task.

This workshop was the first in a series of workshops addressing inverse problems. The

next one (tentatively scheduled for late spring 2001) will focus mainly on the statistical aspects of inverse problems.

The workshop had several younger participants, two of whom have contributed the following comments.

FIGURE 2. *Eric Clévédé* presenting seismic tomography models for the Earth.

Report by
Kim Emil Andersen and Steen Møller.

The first MaPhySto workshop on inverse problems was held at the Department of Mathematical Sciences at the University of Aarhus in April 22-24, 1999. Several well known senior researchers as well as post docs, Ph.D. students, and other young researchers participated in this workshop on Inverse Problems in Stratified Media. This mixture resulted in a very animated and stimulating workshop with several high-quality discussions. Many fruitful discussions were initiated at the excellent dinners arranged by the university and were often brought into the beautiful sunny park. Also the breaks between the lectures were exploited in different ways. Many discussions on the theoretical understandings and applicability of the lectures took place here.

FIGURE 3. *James Ralston* making sure that notes and black-board are in agreement.

The lectures given at the workshop were very advanced and specialized on both theory and applications. A great deal of effort was therefore required to obtain a proper understanding of the lectures. Hereby, we have experienced that understandable research communication is very important, which of course also influences on our future presentations for audiences with different backgrounds.

FIGURE 4. Participants in the Workshop on Turbulence and Finance.

Workshop on Finance and Turbulence.
The Workshop on 'Finance and Turbulence' was held 5-7 May 1999 at University of Aarhus and was organised jointly by CAF (Centre for Analytical Finance) and MaPhySto, the organizing committee consisting of *Ole E. Barndorff-Nielsen*, *Bent Jesper Christensen*, *Henning Bunzel* (University of Aarhus) and *Michael Sørensen* (University of Copenhagen).

The aim of the Workshop was to discuss the striking similarities, as well as the differences, between key empirical features observed in the financial markets on the one hand and in studies of the turbulence of fluids on the other. Particular emphasis was given to questions relating to realistic stochastic modelling of the phenomena concerned.

FIGURE 5. Conference Dinner.

The participants came from the fields of Physics, Stochastics and Mathematical Finance/Econometrics, and among the topics treated were: *Burgers' Equation, Cascades, Extremal Behaviour, Long Range Dependence, Scaling, Selfsimilarity, and Volatility and Intermittency*.

As for most other MaPhySto workshops, a booklet containing extended abstracts of (most of) the talks given at the workshop has been issued as a volume in the MaPhySto Miscellanea series. The programme and the list of participants are also included in the volume.

Concentrated Advanced Course on Free Probability. In the week Monday, 17 May, 1999 to Saturday, 22 May, 1999, MaPhySto organized, at Odense University, a concentrated course on Voiculescu's free probability theory and related topics. There were two series of lectures given by *Ken Dykema* and *Uffe Haagerup* as well as a few invited talks by other researchers in the area, and the course had 22 participants from 7 countries. Later in this newsletter (under the 'Personalia' section) you find a short description of the subject of *Free Probability* given by one of the participants, *Steen Thorbjørnsen* who is newly employed MaPhySto postdoc.

Graduate Course on Modular forms and Dirichlet series. In the spring term *Alexei Venkov* taught this course at the Department of Mathematical Sciences, University of Aarhus. The course will continue in the fall term of 1999 under the same title.

Advanced course on Second-quantized Hamiltonians. On August 9-10, 1999 *Jan Dereziński* gave a concentrated advanced course on the mathematics of second-quantized Hamiltonians.

Seminar on Geometric Mathematical Physics. The Geometric Mathematical Physics seminar, organized by *Jørgen Ellegaard Andersen*, has in the spring term had talks by *Justin Sawon*, *Kazuo Habiro*, *Gideon Maschler*, *Bert van Geemen* and *David Adams*. The seminar will continue in the fall; see more information at
`www.maphysto.dk/events/GMFseminar/.`

FUTURE EVENTS

On the following pages you find excerpts of announcements of some forthcoming MaPhySto activities. In most cases more information can be found from our web-site.

For a full (and up-to-date) listing we refer you to our web-page
`www.maphysto.dk/events/`

Workshop on Stochastics and Quantum Physics.
University of Aarhus, Thursday 21 October – Tuesday 26 October, 1999.

The Workshop will focus on some of the areas where concepts and techniques from Stochastics (i.e. Probability and Mathematical Statistics) are, or seem likely soon to become, of real quantum physical importance. By bringing together leading physicists and mathematicians, having an active interest in the themes of the Workshop, it is hoped to foster fruitful discussions and collaboration on the role and use of Stochastics in Quantum Physics.

Among the confirmed speakers are: *A. Barchielli, F. Bardou, V. P. Belavkin, H. Carmichael, R. D. Gill, P. Høyer, A. S. Holevo, G. Lindblad, H. Maassen, G. Mahler, S. Massar, I. Percival, D. Petz, S. Popescu and B. Øksendal.*

More information can be found from:
`www.maphysto.dk/events/QuantumStoc99/`

Workshop on Computational Stochastics.
University of Aarhus, January 17-22, 2000.

Computational stochastics is a new and expanding area of stochastics, dealing with computational methods of analyzing complex mathematical and statistical models. The workshop intends to discuss the potential strength and impact of this new discipline in a variety of applications. It is held at the Department of Mathematical Sciences, University of Aarhus, and organized by StocLab (Laboratory for Computational Stochastics, University of Aarhus) and MaPhySto. The organizing committee consists of *Søren Asmussen* (Lund) and *Eva B. Vedel Jensen* (Aarhus).

The keynote addresses will contain a fair amount of tutorial material. The list of speakers is as follows:

- *Adrian Baddeley* (Perth)
  Conditional simulation

- *Peter Donnelly* (Oxford)
  Computational inference in genetics
- *Ian Dryden* (Leeds)
  Stochastic deformation
- *Peter Glynn* (Stanford)
  Simulation methodology in applied probability
- *Ole Mouritsen* (DTU, Copenhagen)
  The third science — the computer experiment
- *William Stewart* (Raleigh, NC)
  Numerical methods for Markov chains

More information can be found from:
`www.maphysto.dk/events/CompStoc2000/.`

Concentrated Advanced Course on Lévy Processes, lectures by Ken-iti Sato (Nagoya University).

University of Aarhus, January 24-28, 2000.

The course is part of a longer thematic period on Lévy Processes and their applications — the first event in this respect was the *Conference on Lévy Processes: Theory and Applications* held by MaPhySto in January 1999. The present course will be followed by an ordinary graduate course at the Department of Mathematical Sciences, University of Aarhus. Furthermore, a follow-up concentrated advanced course on further aspects of the theory of Lévy Processes and some of its applications is tentatively planned to take place in the early fall, 2000.

Lévy processes are stochastic processes on the Euclidean space, stochastically continuous and with stationary independent increments. Examples are Brownian motion, Poisson processes, stable processes (such as Cauchy processes), and subordinators (such as Gamma-processes). They form a basic class in stochastic analysis. This course aims at giving an introduction to elementary properties of Lévy process and to transformations between Lévy processes. Familiarity with the method of characteristic functions and some knowledge of Brownian motion, Poisson processes, and infinitely divisible distributions are expected.

More information can be found from:
`www.maphysto.dk/events/LevyCAC2000/`

Summer School on Stereology and Geometric Tomography.

Sandbjerg Manor, May 20-25, 2000.

The aim of the summer school is to give an overview of modern stereology and its relation to geometric tomography, including both the mathematical and statistical theory and the practical applications.

Stereology is the area of stochastics dealing with statistical inference about spatial structures from geometric samples of the structure such as two-dimensional sections and one-dimensional probes. The development of stereological methods involve the use of advanced mathematical tools, especially from geometric measure theory and integral geometry. Stereology is now in world-wide use in many areas of biology and medicine, most importantly in neuroscience and cancer grading. Other areas of application are geology, metallography and mineralogy.

Geometric tomography is closely related to stereology, as is apparent from its definition: "geometric tomography is the area of mathematics dealing with the retrieval of information about a geometric object from data about its sections, or projections, or both". Geometric tomography has connections with convex geometry, geometric probing in robotics, computerized tomography, and other areas.

The teaching team includes

- *Adrian Baddeley* (University of Western Australia)
- *Richard Gardner* (Western Washington University)
- *Hans Jørgen G. Gundersen* (University of Aarhus)
- *Eva B. Vedel Jensen* (University of Aarhus)
- *Kiên Kiêu* (Institut National de la Recherche Agronomique, Versailles)

Lectures by invited researchers in related fields such as convex geometry, stochastic geometry and spatial statistics are also planned, as well as lectures by the participants of the summer school.

The summer school will be held at Sandbjerg Manor, a conference centre owned by the University of Aarhus, situated in the southern part of Jutland, Denmark. The summer school is organized jointly by StocLab (Laboratory for Computational Stochastics, University of Aarhus) and MaPhySto.

The summer school is addressed to PhDs, PostDocs and other researchers in mathematics. Scientists from the natural sciences with a strong background and interest in mathematics are also welcome. The number of participants is limited to 50. Participation will therefore be by application only.

More information can be found from:
`www.maphysto.dk/events/S-and-GT2000/`

VISITORS

Below follows the list of visits currently arranged. From the "People" page of `www.maphysto.dk` you can always find up-to-date information about recent, current and coming visitors at MaPhySto.

Jan Dereziński (Warsaw University): **Visiting from 1999/07/16 until 1999/09/13.**

Gregor Masbaum (Université Paris 7): **Visiting from 1999/08/17 until 1999/09/10.**

Vojkan Jaksic (Ottawa): **Visiting from 1999/08/30 until 1999/09/10.**

Ara Sedrakyan (Yerevan Physics Institute): **Visiting from 1999/09/01 until 1999/09/30.**

Aimé Lachal (INSA Lyon): **Visiting from 1999/09/04 until 1999/09/11.**

Jerzy Jurkiewicz (Jagiellonian University): **Visiting from 1999/09/06 until 1999/09/30.**

Valery T. Stefanov (Univ. of Western Australia): **Visiting from 1999/09/07 until 1999/09/17.**

Nick H. Bingham (Birkbeck College): **Visiting from 1999/09/12 until 1999/09/16.**

Jeannette Wörner (Freiburg): **Visiting from 1999/09/16 until 1999/12/15.**

Peter E. Jupp (St Andrews, Scotland): **Visiting from 1999/09/25 until 1999/12/31.**

Fred Espen Benth (University of Oslo): **Visiting from 1999/10/17 until 1999/11/12.**

Mykola Leonenko (Kiev University): **Visiting from 1999/10/20 until 1999/11/20.**

David Hobson (Bath): **Visiting from 1999/10/25 until 1999/10/31.**

George Nenciu (Romanian Acad. of Sciences): **Visiting from 1999/11/01 until 1999/11/30.**

Ken-iti Sato (Nagoya University): **Visiting from 2000/01/20 until 2000/03/30.**

PERSONALIA

Ole E. Barndorff-Nielsen. On April 29, 1999 *Ole E. Barndorff-Nielsen* received an honorary doctorate from Katholieke Universiteit, Leuven.

Steen Thorbjørnsen. For the period June 1, 1999 to December 1, 2000 *Steen Thorbjørnsen* is employed by MaPhySto in a post doctoral position at the Department of Mathematics and Computer Science, University of Southern Denmark (Odense). Steen received his PhD from the University of Odense last fall and has since then been at Texas A&M University.

As Steen's research areas (random matrices, free probability) are in between mathematical physics and probability theory and therefore may be of interest to the experts of both fields, we have asked him to give a short description of the subject.

What is Free Probability? As seen by *Steen Thorbjørnsen*.
The subject *free probability theory* was founded and developed during the 1980's by Professor *D. V. Voiculescu* (U.C. Berkeley). His main idea was to translate notions from "classical" probability theory to a non-commutative (i.e., operator theoretical) framework, and the goal was to use the "probabilistic methods" thus obtained, to gain new insight in von Neumann algebra theory, in particular the theory of the free group factors (the von Neumann algebras associated to the free groups $\mathbb{F}_n$, $n = 2, 3, 4, \ldots$). The goal was definitely attained, and since Voiculescu's pioneering work in the 1980's, a large group of mathematicians have joined him in the effort to develop free probability theory and its applications to operator algebra theory.

A key feature of free probability theory is the replacement of the notion of independence in "classical" probability theory by a highly non-commutative concept: *freeness*. Though freeness is different from independence, the two concepts share a lot of common features. For example there is a central limit theorem, in which independence is replaced by freeness. In this "free central limit theorem", the limit distribution is no longer the Gaussian distribution, but the semi-circle distribution: $\frac{1}{2\pi}\sqrt{4 - x^2} \cdot 1_{[-2,2]}(x)\,dx$, and it is a general fact in free probability, that the semi-circle distribution substitutes the Gaussian distribution as "most important distribution". The importance of the semi-circle distribution became clear already in the 1950's, when the physicist *E. P. Wigner* discovered, that the spectral distributions of selfadjoint Gaussian random $n \times n$ matrices converge, as $n \to \infty$, to the semi-circle distribution. One of the most important results in free probability, *Voiculescu's random matrix model*, states that Wigner's result generalizes to families of independent selfadjoint Gaussian random matrices. In particular, the independence between the random matrices is transformed, as $n \to \infty$, into freeness, and this fact provides an interpretation of freeness as an asymptotic non-commutative version of independence.

Fred Espen Benth. The first postdoc employed by MaPhySto, *Fred Espen Benth*, has recently (August 1, 1999) moved to a postdoctoral position at the Department of Mathematics, University of Oslo. Fred will, however, also in the future participate in the activities of MaPhySto. It is the idea that he (together with *B. Øksendal*) should be a kind of MaPhySto 'liason' to the stochastics community in Norway.

For similar reasons, Fred recently participated in the Trento meeting *White Noise Approach to Classical and Quantum Stochastic Calculi*, partly as 'MaPhySto-delegate'. We bring here his findings about the meeting:

> The summerschool was successfully
> organized by professors L. Accardi
> and I. G. Volovich in the beautiful
> city of Trento. About 60, young as
> well as established, researchers
> from almost every corner of the
> world participated, indicating the

widespread interest for the topics of the school.

The main lectures were held by professors Accardi, Hida, Kuo, Lu, Obata and Volovich. There were also shorter presentations by other distinguished researchers. For us young participants it was especially inspiring to listen to professor Hida's lectures, the originator of the White Noise Analysis. All presentations were of a high pedagogical and scientific standard, ranging from introductory level to more "state of the art".

I think everyone left the school with new knowledge and interesting scientific problems to work on. Finally, we will all miss the big Italian dinners....

Klaus Mølmer. On June 3, 1999 *Eugene Polzik* and *Klaus Mølmer* from the Department of Physics, University of Aarhus received the NKT Prize for their research in both theoretical and experimental quantum optics.

Eva. B. Vedel Jensen. As of August 1, 1999, *Eva. B. Vedel Jensen* has been nominated Co-ordinating editor of the section *Stochastic Geometry and Statistical Applications* of the journal *Advances in Applied Probability*.

Michael Sørensen. At the 52nd Session of the International Statistical Institute (ISI) in Helsinki, Finland, *Michael Sørensen* was nominated chairman of the *European Regional Committee of the Bernoulli Society for Mathematical Statistics and Probability*, for the term 2000-2002.

Chi-Wei Herbert Lee. From September 1, 1999 and two years onwards *Herbert Lee* will be employed as a MaPhySto postdoc at the Department of Mathematics, University of Copenhagen. Herbert received his PhD from the University of Rochester earlier this year. Herbert's fields of interest are matrix models in quantum theory and their symmetry algebras.

PUBLICATIONS

Below you will find a list of recent publications from MaPhySto. You may order the publications from MaPhySto or go to the MaPhySto web-page `www.maphysto.dk` from where you may down-load (most of) the publications mentioned.

Research Reports (ISSN 1398-2699).

1999-27 (August 1999): *Brown's Spectral Distribution Measure for R-diagonal Elements in Finite von Neumann Algebras* by Uffe Haagerup, Flemming Larsen.

1999-26 (August 1999): *Mixed Moments of Voiculescu's Gaussian Random Matrices* by Steen Thorbjørnsen.

1999-25 (August 1999): *Perfect simulation for sample-based inference* by Jesper Møller, Geoff K. Nicholls.

1999-24 (August 1999): *Quantum scattering for homogeneous of degree zero potentials* (Absence of channels at local maxima and saddle points) by Erik Skibsted, Ira Herbst.

1999-23 (July 1999): *Stopping Brownian Motion without Anticipation as Close as Possible to its Ultimate Maximum* by Svend Erik Graversen, Goran Peskir, Albert N. Shiryaev.

1999-22 (June 1999): *Martingale Representation, Chaos Expansion and Clark-Ocone Formulas* by Arne Løkka.

1999-21 (June 1999): *Optimal portfolio selection with consumption and nonlinear integro-differential equations: A viscosity solution approach* by Fred Espen Benth, Kenneth Hvistendahl Karlsen, Kristin Reikvam.

1999-20 (June 1999): *Market Forces and Dynamic Asset Pricing* by Goran Peskir, J. Shorish.

1999-19 (June 1999): *Risk neutral densities of the 'Christmas tree' type* by Jens Ledet Jensen, Niels Væver Hartvig, Jan Pedersen.

1999-18 (May 1999): *Phillips-Sarnak's Conjecture for Hecke Groups with Primitive Character* by Erik Balslev, Alexei Venkov.

1999-17 (May 1999): *Multiplicative censoring: density estimation by a series expansion approach* by Martin Bøgsted Hansen, Kim E. Andersen.

1999-16 (April 1999): *A note on gamma random variables and Dirichlet series* by Zbigniew J. Jurek.

1999-15 (April 1999): *Higher Skein Modules, II* by Jørgen Ellegaard Andersen, Vladimir Turaev.

1999-14 (April 1999): *Prediction-Based Estimating Functions* by Michael Sørensen.

1999-13 (April 1999): *Smoothed Langevin Proposals in Metropolis-Hastings Algorithms* by Øivind Skare, Fred Espen Benth, Arnoldo Frigessi.

1999-12 (March 1999): *Packing Densities and Simulated Tempering for Hard Core Gibbs Point Processes* by

Jesper Møller, S. Mase, D. Stoyan, R. P. Waagepetersen, G. Döge.

1999-11 (March 1999): *Perfect Metropolis-Hastings simulation of locally stable point processes* by Jesper Møller, Wilfrid S. Kendall.

1999-10 (February 1999): *A note on the multi-dimensional monotone follower problem and its connection to optimal stopping* by Fred Espen Benth, Kristin Reikvam.

1999-9 (February 1999): *Modelling stochastic changes in curve shape* (with an application to cancer diagnostics) by Eva B. Vedel Jensen, Asger Hobolth.

1999-8 (February 1999): *When are local stereological volume estimators exact?* by Eva B. Vedel Jensen, Liselotte Petersen.

1999-7 (February 1999): *Asymptotic normality of the maximum likelihood estimator in state space models* by Jens Ledet Jensen, Niels Væver Petersen.

1999-6 (January 1999): *Parameter identification for stochastic Burgers flows via parabolic rescaling* by Nikolai N. Leonenko, Wojbor A. Woyczynski.

1999-5 (January 1999): *On the ruin problem for some adapted premium rules* by Søren Asmussen.

1999-4 (January 1999): *Stability of Character Resonances* by Erik Balslev, Alexei Venkov.

1999-3 (January 1999): *Spectral theory of Pauli-Fierz Hamiltonians I.* by Jan Derezinski, Vojkan Jaksic.

1999-2 (January 1999): *Superposition of Ornstein-Uhlenbeck Type Processes* by Ole E. Barndorff-Nielsen.

1999-1 (January 1999): *Phillips-Sarnak's conjecture for* $\Gamma_0(8)$ *with primitive character* by Erik Balslev, Alexei Venkov.

Lecture Notes Series (ISSN 1398-2702).

No. 5 (August 1999): *Empirical and partial-sum processes; revisited as random measure processes* by Peter Gaenssler, Daniel Rost.

No. 4 (August 1999): *Notes on Empirical Processes* by R. M. Dudley.

No. 3 (July 1999): *Marked Point Processes and Piecewise Deterministic Processes* by Martin Jacobsen.

No. 2 (March 1999): *Stochastic Simulation* (with a view towards stochastic processes) by Søren Asmussen.

No. 1 (December 1998): *An introduction to p-variation and Young integrals* by R. M. Dudley, R. Norvaiša.

Miscellanea (ISSN 1398-5957).

No. 14 (July 1999): *Miniproceedings: Workshop on Finance and Turbulence* by Ole E. Barndorff-Nielsen, Bent Jesper Christensen, Henning Bunzel, Michael Sørensen (eds.).

No. 13 (July 1999): *Mini-proceedings: First MaPhySto Workshop on Inverse problems* (Inverse Problems in Stratified Media) by Arne Jensen, Jens Ledet Jensen, Bo Holm-Jacobsen (eds.).

No. 12 (May 1999): *Kolmogorov and the Turbulence* by A.N. Shiryaev.

No. 11 (April 1999): *Mini-proceedings: Conference on Lévy processes: theory and applications* by O. E. Barndorff-Nielsen, S. E. Graversen and T. Mikosch (eds.).

No. 10 (January 1999): *Mini-proceedings from the Workshop on Product Integrals and Pathwise Integration* by Ole E. Barndorf-Nielsen and Thomas Mikosch (eds.).

No. 9 (January 1999): *Stability of Fluid and Stochastic Processing Networks* by J. G. "Jim" Dai.

No. 8 (December 1998): *Report on Workshop on quantum geometry, random matrices, statistical models of strings and quantum gravity* by J. Ambjørn, B. Durhuus and J.P. Solovej (eds.).

No. 7 (December 1998): *Report on Workshop on Geometric Scattering* by Arne Jensen and Erik Skibsted (eds.).

No. 6 (October 1998): *Concentrated Advanced Course on Stochastic Partial Differential Equations* (Exercises and Solutions) by Fred Espen Benth.

GENERAL INFORMATION ABOUT MAPHYSTO

The Centre for Mathematical Physics and Stochastics — MaPhySto — is a mathematical research centre funded by the Danish National Research Foundation. The Centre came into existence on 1 April 1998 and it is located administratively at the Department of Mathematical Sciences, University of Aarhus. The Scientific Director is *Ole E. Barndorff-Nielsen* and a group of about twenty mathematicians,

from the universities of Copenhagen, Odense, Aalborg and Aarhus, are associated with the Centre as "Principal Investigators". In addition, the Centre comprises a number of "Associated Investigators".

The main fields of activity of MaPhySto are *Mathematical Physics* (e. g. quantum mechanics, statistical mechanics, quantum field theory) and *Stochastics* (e. g. stochastic analysis, interacting particle systems, stochastic matrices, free probability), with some particular emphasis on the interplay between these two fields. Aspects of *Stochastic Computation, Inverse Problems* and *Analytic Number Theory* are also part of the ambit of the Centre.

The personal research of the participating investigators form the backbone of the Centre activities. Based on this, MaPhySto aims to build up knowledge and research in parts of the above-mentioned areas that seem of key importance for future developments in mathematics, whether theoretical or applied. It is sought, in particular, to expand and make more coherent the spectrum of competence represented in mathematics in Denmark.

Concretely, MaPhySto seeks to achieve this through a broad range of activities: short and long term visits by leading international researchers; workshops; conferences; concentrated advanced courses; and summer-schools. Longer lecture series by international or Danish mathematicians are also given.

As an important element in securing a lasting effect of these endeavours the Centre has a number of postdoc positions, that are generally announced internationally via electronic job-advertisment bulletin boards (and of course also via our own web-site).

CONTACT INFORMATION

The Centre may be contacted at:

MaPhySto — Centre for
Mathematical Physics and Stochastics
Department of Mathematical Sciences
University of Aarhus
DK-8000 Aarhus C
Denmark.

Telephone: (+45) 8942 3532.

Email: `maphysto@maphysto.dk`

WWW: `http://www.maphysto.dk/`

Do not hesitate to contact the staff of the Centre to obtain further information:

- Ole E. Barndorff-Nielsen,
  scientific director,
  email: `oebn@maphysto.dk`,
  telephone: (+45) 8942 3521.
- Søren Have Hansen, project manager,
  email: `shave@maphysto.dk`,
  telephone: (+45) 8942 3515.
- Oddbjørg Wethelund, secretary,
  email: `oddbjorg@maphysto.dk`,
  telephone: (+45) 8942 3532.