

# EURANDOM

Report 2010

**European Institute for  
Statistics, Probability, Stochastic Operations Research and their Applications**  
Location: Eindhoven University of Technology  
P.O. Box 513, 5600 MB Eindhoven, The Netherlands  
Telephone: +31 (0)40 247 8100, Telefax: +31 (0)40 247 8190  
E-mail: [office@eurandom.tue.nl](mailto:office@eurandom.tue.nl)  
<http://www.eurandom.tue.nl>

## **New People in 2010**

### **MRM**

Andrea Krajina (UvT & EURANDOM)  
Umut Can (UvT & EURANDOM)

### **QPA**

Jan-Pieter Dorsman  
Ohad Perry  
Florian Simatos  
Elena Vatamidou

### **RSS**

Elie Aidekon  
Jesse Goodman

### **SIM**

Martin Roth

## **People who left in 2010**

### **MRM**

- Andrea Krajina → University of Göttingen, Germany
- Henrik Jönsson → ABS Methodology Analyst at BNP Paribas Fortis, Brussels, Belgium
- Mitja Stadje → University of Tilburg, The Netherlands

### **QPA**

- Josine Bruin → Quintiq, 's-Hertogenbosch, The Netherlands
- Liqiang Liu →
- Yoni Nazarathy → Technical University of Swinburne Australia
- Ingrid Reijnen → assistant professor TU/e; (visiting) post-doctoral research associate at The Wharton School, Philadelphia

### **RSS**

- Artem Sapozhnikov → ETH Zürich, Switzerland
- Liu Xu → Technical University of Berlin, Germany

### **SIM**

- Mikhail Langovoy → MPI for Biological Cybernetics, Tübingen, Germany

### **NiMH**

- Alexander Lyedovskikh → Technical University of Eindhoven, Chemical Department, The Netherlands

**In:** 9 junior researchers

**Out:** 11 junior researchers

**Out of 11 postdocs and PhD students who left EURANDOM, 7 got a position as assistant professor or lecturer at a university in the Netherlands (2) or abroad (5), 3 got a position in the (financial) industry in Belgium and in the Netherlands.**

## People

### Board

Prof.dr. F.A. van der Duyn Schouten (Chair/treasurer)  
Prof.dr.ir. C.J. van Duijn (member)  
Prof.dr.ir. G. van Oortmerssen

At the end of 2010 prof. dr. F.A. van der Duyn Schouten and prof. dr. Ir. G. van Oortmerssen stepped down as board member.

### Scientific Council

Professor J. Beirlant (KU Leuven, Belgium)  
Professor S. Borst (Eindhoven University of Technology and Lucent, Murray Hill, USA)  
Professor D. Dawson - Chair (Carleton University, Ottawa & McGill University, Montreal, Canada)  
Professor A. Frigessi (University of Oslo, Norway)  
Professor A. Greven (Friedrich-Alexander Universität, Erlangen-Nürnberg, Germany)  
Professor Ph. Robert (Centre de Recherche INRIA Paris-Rocquencourt)  
Professor A. Schied (Mannheim University, Germany)  
Professor V. Schmidt (Ulm University, Germany)  
Professor D. Silvestrov (Mälardalen University, Sweden)  
Professor V. Sidoravicius (CWI, Leiden University, The Netherlands)  
Professor A.W. van der Vaart (Vrije Universiteit Amsterdam, The Netherlands)  
Professor N. Veraverbeke (Hasselt University, Diepenbeek, Belgium)  
Professor T. de Wet (University of Stellenbosch, South Africa)

The scientific council of EURANDOM met on December 2, 2010.

A lectureday was organized around this meeting with a special emphasis on financial mathematics:

T. de Wet	Estimating Measures of Inequality
F. Guillaume	Multivariate option pricing models: some extensions of the alpha-VG model
A. Ferreira Castilla	On the density of log-spot in the Heston volatility model
M. Stadje	Optimal Portfolio Choice Under Ambiguity
D. Silvestrov	Optimal Stopping and Convergence for American Type options

### Directors

Prof.dr.ir. O.J. Boxma (Eindhoven University of Technology & EURANDOM), scientific director  
Drs. C.M.M. Cantrijn, managing director

### Scientific staff

#### Senior Fellows (15)

##### Multivariate Risk Modelling

Dr. R.J.A. Laeven (Tilburg University)  
Professor W. Schoutens (KU Leuven, Belgium)  
Professor J. Teugels (KU Leuven, Belgium)

##### Queueing and Performance Analysis (QPA)

Professor I.J.B.F. Adan (Eindhoven University of Technology)  
Professor G.J.A.N. van Houtum (Eindhoven University of Technology)  
Professor M.R.H. Mandjes (CWI & University of Amsterdam)  
Professor A.P. Zwart (CWI)

##### Random Spatial Structures (RSS)

Professor R.W. van der Hofstad (Eindhoven University of Technology)  
Professor W.Th.F. den Hollander (Leiden University)  
Professor V. Sidoravicius (CWI / Leiden University)

##### Statistical Information and Modelling (SIM)

Dr. E. Belitser (University Utrecht) from September 2009  
Professor M.C.M. de Gunst (VU University, Amsterdam)

Professor G. Jongbloed (Delft Technical University)  
Professor C.A.J. Klaassen (University of Amsterdam)  
Professor J.H. van Zanten (Eindhoven University of Technology) from 1 September 2009

### **General**

Dr.ir. A.J.E.M. Janssen

### **Junior staff**

The junior scientific staff of EURANDOM consists of Postdocs (PDs) with appointments from 6 months up to 2-3 years; PhD-students (PhDs) with appointments of 4 years and research fellows with part-time 1-year appointments.

\*\*\*\*\*

### **Scientific Staff**

On December 31, 2010, 27 junior researchers (PDs and PhDs) were working at EURANDOM.

### **Multivariate Risk Modelling**

#### **PDs**

Andrea Krajina (from March 1 until September 1; joint appointment with UvT))

Umut Can (since September 1, joint appointment with UvT)

Henrik Jönsson (until November 1)

Mitja Stadje (until September 1)

#### **PhDs**

Florence Guillaume

### **Queueing and Performance Analysis**

#### **PDs**

Liqiang Liu (until December, 31)

Andreas Löpker (until December, 1)

Yoni Nazarathy (until November, 1)

Seva Shneer (until June, 1)

Ohad Perry (affiliated at CWI, part time at Eurandom)

Florian Simatos (affiliated at CWI, part time at Eurandom)

#### **PhDs**

Paul Beekhuizen (until January, 31)

Remco Bierbooms

Marko Boon

Josine Bruin (until June, 11)

Çağdas Büyükkaramikli

Jevgenijs Ivanovs

Kamil Kosinski

Ingrid Reijnen-Koens (until October, 31)

Peter van de Ven

Sandra van Wijk

Eleni Vatamidou (since November, 1)

### **Research Fellows**

Johan van Leeuwen (Eindhoven University of Technology)

Maria Vlasiou (Eindhoven University of Technology)

### **Random Spatial Structures**

#### **PDs**

Sandra Kliem

Anton Klymovskiy

Artem Sapozhnikov (until September 1)

Lihu Xu (until September 1)

Jesse Goodman (since September 1)

Elie Aidekon (since January 1)

## PhDs

Robert Fitzner (affiliated at TU/e, part time at Eurandom)  
Sander Dommers (affiliated at TU/e, part time at Eurandom)  
Tim Hulshof (affiliated at TU/e, part time at Eurandom)  
Maren Eckhoff (since October 15; affiliated at TU/e, part time at Eurandom)

## Research Fellows

Cristian Giardinà (Eindhoven University of Technology)  
Francesca Nardi (Eindhoven University of Technology)

## Statistical Information and Modelling

### PDs

Mikhail Langovoy (until September 1)

## PhDs

Paulo de Andrade Serra  
Bartek Knapik  
Botond Szabo (since February, 1)  
Martin Roth (since November, 1)  
Moritz Schauer (since November, 1; affiliated at TUD and part time at EUrandom)

## Longterm visitors

Florin Avram (September 9 until December 3) "en délégation" by CNRS  
Gregory Maillard (September 1 until August 31) "en délégation" by CNRS  
Albert Ferreiro-Castilla (September 22 until December 23) Universitat Autònoma de Barcelona

## Funding

During the year 30 junior researchers were (co-)financed by external funds, from which:

### In natura (11):

1 PhD on a Philips contract (Beekhuizen)  
11 PhDs of the Department of Mathematics and Computer Science, part-time 0,2 à 0,6 (Dommers, Hulshoff, Boon, Fitzner, Van de Ven, Van Wijk, Bierbooms, Eckhoff, Vatamidou; Szabo, Dorsman –the latter two have STAR appointments)  
1 PD out of NWO-VICI grant Professor R.W. van der Hofstad (Aidekon)  
3 PhDs of the Department of Industrial Engineering & Innovation Sciences, part-time 0,2 (Reijnen, Büyükkaramikli, Jansen)  
1 PhD from the VU, via Van der Vaart/Van Zanten (TU/e), part-time (0,2) (Knapik)

### Grants (7):

1 PD on a 3-years EIB grant (Jönsson)  
1 PD on a 3-years industry grant (Falcon) (Liu)  
1 PhD on a VC grant since October 2008, jointly employed with UvA (Kosinski)  
3 PhD's on joint STAR appointments (Szabo, Dorsman and Schauer)

### Joint appointments (6):

Joint appointment with University of Amsterdam: 2 PhDs (Ivanovs&Kosinski)  
Joint appointment with Eindhoven University, M&CS: 2 PhDs (Bruin 0,5 until June and Bouman 0,3); 2 PDs à 0,3 each (Shneer – until June, Löpker – until December)  
Joint appointment with University of Utrecht, 1 PhD (Serra - until August; from then on: joint appointment with M&CS, TU/e)  
Joint appointment with Eindhoven University of Technology, Department of Mechanical Engineering (out of VIDI grant of dr. E. Lefeber): 1 PD (Nazarathy)  
Joint appointments with University of Tilburg: 2 PD's (Krajina and Can)  
Joint appointment with KULeuven, 1 PhD (Guillaume)

**Administrative Support:**

Mrs. M.E.J.G.H. (Marlies) Brangers - management assistant (0,9 fte) until September 23.

Mrs. L. (Lucienne) Coolen-van Will - workshop officer (0,9 fte) until June 1.

Mrs. P.M. (Patty) Koorn - administrative officer (0,5 fte) June 1, from then on workshop officer (0,7 fte)

Mrs. J. (Jolanda) Mensen – administrative officer (0,5 fte) from June 10.

Mrs. P. (Petra) Rozema-Hoekerd – management assistant (0,7 fte) from September 20.

*During 2010, 40 junior researchers worked at EURANDOM. A total of 14,8 fte was employed by Eindhoven University of Technology, EURANDOM, including the managing director and the support staff, not included the scientific director, senior and research fellows.*

*In addition 15 senior scientists were associated with EURANDOM as senior fellow and 4 junior scientists were associated as research fellow.*

*In 2010 9 researchers started to work at EURANDOM, 11 researchers left EURANDOM.*

## RESEARCH PROGRAMMES

### Multivariate Risk Modelling (MRM)

#### Sami Umut Can

Dr. Umut Can has been studying the limiting behavior under scaling of random walks in heavy-tailed random environments. He has shown that the limiting continuous-time processes are alpha-stable self-similar processes that exhibit a rich statistical structure. This work is a continuation of Dr. Can's Ph.D. dissertation under Dr. Gennady Samorodnitsky (Cornell University). Dr. Can has also been studying goodness-of-fit tests for copulas in a joint project with Professors John Einmahl and Roger Laeven (Tilburg University). They are working on a transformation of the empirical copula process into a standard two-parameter Wiener process. Such a transformation can be used to construct distribution-free goodness-of-fit tests for parametric families of copulas. Their results so far describe the transformation for the simple null hypothesis case.

#### Andrea Krajina

Andrera Krajina has worked on the following two projects.

(i) finishing a paper with dr. J. Segers (UC Louvain) and prof. dr. J.H.J. Einmahl (UvT Tilburg), *An M-Estimator of Tail Dependence in Arbitrary Dimensions*. The paper stemmed from her PhD thesis and will be submitted in September for a journal publication. In this paper they introduce an M-estimator of an unknown parameter of a tail dependence function, assuming the tail dependence function belongs to a parametric family. We prove the estimator is consistent and asymptotically normal, and illustrate its behavior on examples.

(ii) Jointly with dr. R. Laeven (UvT Tilburg and Eurandom) she has started working on a joint project dealing with the parametric estimation of the Lévy copula. There exists a limit relation for Lévy copula, see Kallsen and Tankov (2006), which in its form mimics the definition of the tail dependence function. We use this similarity and combine the nonparametric estimator of Lévy copula, Laeven (2010), with the M-estimator proposed in Einmahl et al. (2010) to construct an M-estimator of an unknown parameter of a parametric Lévy copula. We show that the estimator is consistent and asymptotically normal, and compare its performance to that of the nonparametric estimator. Further research will extend this approach to a wider class of stochastic processes, such as semi-martingales.

#### Florence Guillaume

Together with Prof. Wim Schoutens, Florence Guillaume has investigated the model and calibration risks under the Heston model arising from different calibration procedures and different specification of the objective functions.

Furthermore, together with Prof. Jose Manuel Corcuera, Prof. Dilip Madan and Prof. Wim Schoutens, she has worked on the concept of implied liquidity which isolates and quantifies the liquidity risk in a fundamental way.

More recently, she has worked on multivariate Lévy models, and more precisely on extensions of the alpha-VG model.

#### Henrik Jonsson

Dr. Henrik Jonsson started in July 2008 to work on the "Quantitative analysis and analytical methods to price securitization deals" project sponsored by European Investment Bank. Together with Francesca DiGirolamo and Dr. Francesca Campolongo at the European Commission's Joint Research Center in Ispra and Prof. Dr. Wim Schoutens (KU Leuven) Henrik has worked on global sensitivity analysis of ABS ratings and the development of a rating approach based on global exploration of the input parameter space during 2010. This research has resulted in two papers that are in their final stage and will be finalised in the beginning of 2011.

Henrik has also continued his collaboration with Dr. Alexander Herbertsson, School of Economics, Gothenburg University, Sweden, on the development of an advanced dynamic reduced form credit model for rating ABS. This project is likely to result in two papers during first half of 2011.

## Queueing and Performance Analysis (QPA)

### Remco Bierbooms

Together with Ivo Adan (TU/e) and Marcel van Vuuren (CQM), Remco Bierbooms has been investigating tandem production lines with continuous material flows, in which machines are unreliable. This research is closely related to a real life production line at Heineken brewery in 's-Hertogenbosch, where a simulation model is successfully implemented. An (approximative) analytical model has been constructed for these type of production lines, in which the general nature of up- and downtime distributions is a distinguishing feature compared to other approximations.

Furthermore, he worked on analytical models for production systems with WIP-dependent service times together with Ivo Adan, Pascal Etman, Marcel van Vuuren, and Casper Veeger.

### Marko Boon

Marko Boon has continued his PhD research under the supervision of Onno Boxma and Ivo Adan. The topic of his research is polling systems and their applications, in particular to signalised intersections. In 2010 he has started writing his thesis and a preliminary version has been sent to the committee. At April 4, 2011, he defends his thesis at TU Eindhoven.

### Niek Bouman

Together with Sem Borst and Johan van Leeuwen, Niek Bouman has studied the stability of wireless networks whose users are distributed over a compact space. Further, they compared SINR interference models to interference models based on interference graphs and they examined fluid limits and delay issues in wireless networks with backlog-based random-access mechanisms.

### Josine Bruin

Together with Jan van der Wal, Josine looked at the construction of a dynamic production strategy in a multi-item production system. Both a production system with lost sales and a production system with backlogged customers are studied.

For the production system with lost sales, a similar production strategy is constructed for systems with two machines.

### Cagdas Büyükkaramikli

Together with Will Bertrand, Henny van Ooijen and Nesim Erkip, he continued to work on his PhD project which is on the use of capacity flexibility of a maintenance service provider in specialized and commoditized system environments.

Together with Ivo Adan and Bernardo D'auria he works on the performance modelling (moments of the sojourn time) of a single server queueing system which has regular customers who are waiting for a service at a compensation and opportunity customers who do not wait and requires immediate service.

Together with Sandra van Wijk, he studies the optimal control of the above mentioned problem.

### Jan- Pieter Dorsman

Since the start of his PhD-position in September, J.L. Dorsman has been studying the properties of an extension of the well-known machine-repair model in reliability theory, where we now assume that each machine is also serving its own queue with its own customer arrival stream. The lengths of these separate queues are correlated due to machines competing for repair resources.

Several results were derived for this model with two machines and one repair-agent:

- Closed-form expressions for the correlation between two consecutive downtimes of one single machine.
- Closed form expressions for the steady-state marginal queue length distribution assuming these machine downtime correlations.

### Jevgenijs Ivanovs

The main interest of J. Ivanovs lies in Levy processes in random environment. Markov-modulated Brownian motion is a special case of such a process. J. Ivanovs obtained some results concerning its two-sided reflection. Together with Z. Palmowski he managed to construct so-called scale function for this generalized Levy process, which allowed to solve various related exit problems.

### Michiel Jansen

Together with Ivo Adan, Michiel Jansen has been studying the role of workload constraints in linear programming models for Supply Chain Operations Planning.

### **Kamil Kosinski**

Together with Krzysztof Debicki, Tomasz Rolski (University of Wroclaw) and Michel Mandjes (KdVI, CWI, EURANDOM), Kamil Kosinski has been investigating the question about the logarithmic asymptotics of the probability of extreme values attained by a centered, multidimensional Gaussian process. Furthermore, with Onno Boxma (EURANDOM) and Bert Zwart (CWI, EURANDOM) he has been working on the problem of the convergence of the all-time supremum of a Levy process in the heavy-traffic regime. Closely related to this question is a corresponding problem in the Gaussian setting. Together with Krzysztof Debicki and Michel Mandjes he has obtained some results for this problem. During his stay in April at the University of Wroclaw and Debicki's visit in November at KdVI, together with Michel Mandjes, they worked on the problem of the infimum attained by a reflected Levy process. Finally, during Offer Kella's (Hebrew University of Jerusalem), together with Onno Boxma, they solved the problem of the joint, steady-state queue length distribution at an arbitrary epoch in polling systems.

### **Andreas Löpker**

During the visit at Eurandom of Offer Kella he worked with him on a generalized lack of memory property. With David Perry and Onno Boxma a paper was submitted to JAP about threshold policies in risk theory and the relation to queueing. With Shaul Bar-Lev and Wolfgang Stadje they worked on the small time behavior of Levy subordinators. With Yoav Kerner a project has been continued regarding a so called 'overshoot operator'. With Bernd Heidergott and Haralambie Leahu he work on Perturbation analysis of inhomogeneous Markov Processes.

### **Yoni Nazarathy**

Together with Ahmad Al-Hanbali, Michel Mandjes and Ward Whitt, Dr. Nazarathy has worked on departure processes of general single server queues. In addition together with Erjen Lefebvre he has analyzed control aspects of complex queueing networks.

### **Ohad Perry**

Together with Itai Gurvich from the Kellogg school of management, Northwestern university, Ohad has been studying a complicated network of overflow queues arising in the context of call-center outsourcing problems. Building on a separation of time scales, arising in the many-server heavy-traffic limits, they have shown that the queues in the inhouse firms are asymptotically independent of the queues in the firm providing the outsourcing services.

In addition, together with Bert Zwart and Arnoud den Boer from CWI he has been working on an inventory model in a randomly changing price environment.

### **Florian Simatos**

Together with A. Lambert (Paris 6) and B. Zwart (CWI), Dr. Florian Simatos has been interested in the heavy traffic limit of the Processor-Sharing queue. They came up with an original answer to this open problem involving excursion theory and branching processes. Furthermore, he has been working with V. Bansaye (Ecole Polytechnique) on scaling limits for Galton-Watson processes in varying environment, with S. Borst (Eindhoven) on the heavy traffic limit of mobile networks, and with J. Reed (NYU) and E. Aidekon (EURANDOM) on a stochastic model for limit order books.

### **Seva Shneer**

Together with P. van de Ven, Vsevolod Shneer was investigating the differences in fairness and throughputs achieved by the classical CSMA protocol and its discrete-time analogue. He also started working with Adeal Aziz and Patrick Thiran (EPFL) on designing various protocols improving the performance of CSMA on a line topology. Together with S. Foss (Heriot-Watt University) and Andrey Tyurlikov (Saint-Petersburg), Vsevolod Shneer has been working on the stability of various protocols governing the behaviour of multi-radio users.

### **Peter van de Ven**

Peter van de Ven worked with Sem Borst, Johan van Leeuwen and Alexandre Proutiere on insensitivity and stability of random access networks. They showed that these networks are insensitive to the distributions of the back-off and transmission times, and derived the stability conditions of random-access networks in several cases. With Sem Borst, Johan van Leeuwen and Guido Janssen he furthermore showed that the throughput mapping of random-access networks is globally invertible, and used this to construct several numerical procedures to compute the back-off times that yield a certain network throughput. Together with Sem Borst and Lei Ying, Peter has been investigating the instability of the MaxWeight scheduling algorithm due to inefficient spatial reuse.

**Sandra van Wijk**

Together with Ivo Adan and Geert-Jan van Houtum, Sandra van Wijk studied the creation of pooling in queueing and inventory models. She studies the effect of lateral transshipments in spare parts inventory models, and derives optimal policy structures for Markov decision problem arising in this context. Besides, she continued her research on polling systems.

## Random Spatyal Structures (RSS)

### Elie Aidekon

In a joint work with Remco van der Hofstad, Sandra Kliem and Johan van Leeuwaarden, Dr Elie Aidekon characterized the tail distribution of the size of the biggest cluster in an inhomogeneous random graph. The problem involves the study of hitting times for the so-called thinned Levy process, which appears naturally in the scaling limit of inhomogeneous random graphs.

He also looked at the branching random walk in dimension 1, which is a simple model for the evolution of a population. At each integer time, the particles reproduce and make independent steps. He proved the convergence in law of the minimum of the process, once recentered. In a joint work with Zhan Shi, he also found a Seneta-Heyde type norming for the critical additive martingale, using well-known spine techniques.

Finally, he was interested at the uniform measure on random trees. Given a Galton-Watson tree (let  $X$  be the reproduction law), it is possible to define a uniform measure on the rays: put a weight 1 on each node of height  $n$ , renormalized by the number of vertices at height  $n$ . The weight of a node at height  $k < n$  is then given by the total weight of its descendants at height  $n$ . Then make  $n$  go to infinity. This defines the uniform measure. The Hausdorff dimension of this measure was known when the mean of  $X \log X$  is finite. He showed that the dimension drops to 0 when the mean is infinite.

### Sander Dommers

Together with Cristian Giardinà (Modena and Reggio Emilia University) and Remco van der Hofstad (TU/e) Sander Dommers, MSc has proved an explicit formula for the pressure per particle in the Ising models on a power-law random graph given in earlier work by Dembo and Montanari also holds in the case of infinite variance and not only for finite variance graphs. They also started to investigate the critical behavior of this model in order to prove (or disprove) the predictions of physicists for this critical behavior.

### Maren Eckhoff

Maren Eckhoff started her PhD in October 2010 and acquired a background in random graphs. At the same time she started to derive properties of the weight of the shortest path between two vertices in a complete graph with random edge weights.

### Robert Fitzner

Remco van der Hofstad and Fitzner study nearest-neighbor statistical mechanics models, such as self-avoiding walks, percolation and lattice trees above, but close to, their so-called upper critical dimension. To do this we extend a technique known as lace expansion. The grand challenge is to prove that nearest-neighbor percolation above 6 dimensions displays mean-field behavior. Currently such results are only known above 18 dimensions. In the last two year we derive a expansion for self-avoiding walk and percolation and prepare the analysis of our modified lace expansion. In the next step we apply the modified lace expansion of the first time and will reprove mean-field behavior for self-avoiding walk. After establishing this first result we turn to the problem of percolation and lattice trees and prove mean-field behavior for high dimensions. In this process we refine the analysis and improve the bound to prove the mean-field result in dimension as close as possible to the critical dimension.

### Jesse Goodman

Jesse Goodman has been investigating, with Remco van der Hofstad, the behaviour of first passage percolation on the complete graph when the edge weights have a heavy-tailed distribution. We have identified a crossover regime where the first passage exploration process switches from invasion percolation-type behaviour (the so-called "strong disorder" regime) to a branching-type behaviour (characteristic of the "weak disorder" regime). The work is based on a coupling with a certain infinite tree and a scaling analysis of the resulting branching process.

In addition, with Frank den Hollander, we have been studying disorder relevance in pinning models for random polymers. A focus of inquiry is whether a truncation condition for a related large deviations rate function can be adapted to transparently handle walks with infinite mean return time.

### Tim Hulshof

Together with Markus Heydenreich and Remco van der Hofstad, Tim Hulshof studied the problem of random walk on incipient infinite clusters of long-range percolation. Prerequisite was the construction

of IIC measures for long-range percolation. Several different methods for constructing this measure were achieved using a technique known as "lace expansion".

### **Sandra Kliem**

Together with Prof. Frank den Hollander (Leiden), Prof. Andreas Greven (Erlangen) and Dr. Anton Klimovsky (EURANDOM), Dr. Sandra Kliem constructed a model of hierarchically interacting Cannings processes that is susceptible to a renormalisation analysis. The behaviour of block averages in the limit  $N$  to infinity (here  $N$  denotes the order of the hierarchical group) was proven to be a superposition of a Fleming-Viot process and a Cannings process.

Additionally, in a joint project with Prof. Remco van der Hofstad (TUE), Prof. Johan S.H. van Leeuwaarden (TUE) and Dr. Elie Aidekon (EURANDOM), Dr. Kliem investigated the cluster tails for critical inhomogeneous random graphs with infinite third moments. These cluster tails can be obtained by studying the hitting time of zero of a thinned Levy process.

### **Anton Klimovsky**

Dr. Anton Klimovsky identified the order parameters and the exact comparison hierarchical structures that emerge in the high-dimensional limit of the model of rugged high-dimensional landscapes of Fyodorov, Bouchaud. Together with Prof. Dr. Andreas Greven (Universität Erlangen-Nürnberg), Prof. Dr. Frank den Hollander (Universiteit Leiden/EURANDOM) and Dr. Sandra Kliem (EURANDOM) he identified the renormalization mapping for the hierarchically interacting Lambda-Cannings processes, constructed non-local coalescents and proved well-posedness of the corresponding martingale problems. Furthermore, together with Prof. Dr. Andreas Greven (Universität Erlangen-Nürnberg) and Prof. Dr. Anita Winter (Universität Duisburg-Essen) he proved the well-posedness of the tree-valued Cannings model and identified the universal large-space-time behaviour of the spatial model.

### **Lihu Xu**

I am now mainly working on stochastic PDEs related to Malliavin calculus, functional inequalities, stochastic control theory and ergodic theory. The goal is to understand the connections between the control theory, Malliavin calculus, ergodic theory and functional inequalities.

With Wang we proved a Bismut formula and applied it to obtain the Harnack inequalities and gradient estimates.

With Wang and Wu, we obtained the log-Harnack inequalities of stochastic Burgers equation.

With Wang, we introduced a modified log-Harnack inequality and obtained its connection with asymptotical strong Feller.

With Priola and Zabczyk, we proved the ergodicity of SPDEs driven by  $\alpha$  stable processes.

## Statistics and Information MOdelling (SIM)

### Bartek Knapik

In 2010, he has been working mainly on a Bayesian approach to inverse problems – we want to make inference about some element  $x$  of a Hilbert space, but we are given a noisy version of transformed element of interest –  $Kx$ , where  $K$  is a known, linear operator. Together with Aad van der Vaart (VU Amsterdam and Eurandom) and Harry van Zanten (TU/e and Eurandom) we have investigated several settings of inverse problems, which can be described by the regularity of the signal, the regularity of the prior, and ill-posedness of the transformation, often defined by the spectral properties of the operator  $K$ . Our results concern for instance contraction rates for the full posterior for  $x$ , contraction rates for the (marginal) posterior of linear functional of  $x$ , properties of credible regions, and the Bernstein-von Mises theorem for linear functional of  $x$ . He presented the results during several conferences and workshops, both in the Netherlands and abroad. Those results could be applied to many applications, for instance in optimal control for partial differential equations.

Another example of his research in 2010 is a project he has been working on, together with Bas Kleijn (UvA). They have been studying semiparametric posterior limits under local asymptotic exponentiality. This is closely related to a semiparametric Bernstein-von Mises theorem. When the regularity assumption is relaxed, one cannot expect the Bernstein-von Mises theorem in its classical form to hold. However, posterior limits can be described, leading to a BvM-type assertion.

### Mikhael Langovoy

In 2008 started to work at EURANDOM on spatial statistics and image analysis. My collaborators were Laurie Davies and Olaf Wittich. They proposed a novel statistical method for image analysis. The method uses results from percolation theory and random networks.

They view the object detection problem as a nonparametric hypothesis testing problem within the class of discrete statistical inverse problems. They proposed an algorithmic solution for this testing problem. The proposed algorithm allows to detect objects of unknown shapes in the presence of non-parametric noise that has unknown and possibly heavy-tailed distribution. The algorithm has linear complexity and exponential accuracy and is appropriate for real-time systems. The algorithm has a built-in data-driven stopping rule, so there is no need in human assistance to stop the algorithm at an appropriate step. We performed a rigorous analysis for different variations of our testing procedures.

They are working on extensions of our method to analysis of multidimensional and colored images, and to video processing. We have found applications of our theory to the insect vision problem from mathematical biology. A combination of our method with existing multiscale methods, methods for shape-restricted inference, as well as with machine learning methods, is also under development.

### Martin Roth

His research is focused mainly on extreme value analysis in the context of climatic change. He studies approaches to incorporate for the nonstationarity and the spatial structure of the data. Of particular interest is a nonstationary POT model with index-flood assumption for precipitation extremes.

### Moritz Schauer

Under supervision of Dr. Frank van der Meulen, Prof. Dr. Harry van Zanten and Prof. Dr. Geurt Jongbloed Cand. Moritz Schauer is investigating the computational and theoretical problems of non-parametric Bayesian statistics for diffusion processes using MCMC methods, primarily data augmentation and importance sampling approaches. His PhD research is funded by the STAR cluster of NWO and Delft University of Technology.

### Paulo de Andrade Serra

Non-parametric statistics offers a flexible platform for doing statistical inference under weak assumptions. In this sense it provides a more realistic ways of modeling phenomena. Methods in this field are varied and often its use and implementation is challenging. In Bayesian inference our prior knowledge about unknown parameters of a model are summarized in a prior measure that is then updated using the likelihood of the data to provide a description of the parameters conditional on the data. In the parametric case these methods have been proved to perform as well as frequentist approaches. Less is known in the non-parametric case and the study of Bayesian methods in non-parametric statistics is presently quite active and promising as it would provide us with a unified approach at non-parametric estimation. The main challenges in this field are related to placing prior distributions on infinitely di-

mensional parameters -- typically function spaces -- that result in tractable algorithms and have good properties such as providing us with posterior distributions from which consistent estimators and minimax convergence rates can be obtained.

**Botond Szabo**

In a joint work with Prof. dr. J.H. van Zanten and A.W. van der Vaart he is working on the fundamental understanding of adaptive Nonparametric Bayesian methods using conditionally Gaussian process priors. They focus on the Full Bayes method and Empirical Bayes method. They currently work with the popular White noise model, but later they would like to extend our research to other models as well. They got some surprising results from the analysis of the Empirical Bayes method and they would like to understand the background of this result and compare it with the Full Bayes method.

## NiMH

Research programme: NEOT05004 NiMH battery modeling for automotive BMS

### Ledovskikh, Alexander

Using data of gas-phase dynamic experiment of hydrogen storage identification of parameters of the new gas-dynamic mathematical model which is based on our previous chemical thermodynamic and equilibrium kinetic conceptions has been done. In parallel, preparation for publication of a paper about simulation of exchange current density and electrical double layer capacitance (important surface kinetic effects observed during hydrogen storage) was provided. Theoretical description and model development of the new generation of the Battery Management System (BMS) has also been done. The other direction of the research was extension of our thermodynamic model of hydrogen storage and its connection with Van't Hoff equation

---

### Guido Janssen

Ik ben de afgelopen periode bezig geweest met de volgende onderwerpen:

analytische resultaten Zernike cirkelpolynomen t.b.v. diffractie in optica/akoestiek en design lijndetector voor beeldanalyse,  
analytische ondersteuning aan ASML t.b.v. diffractie-integralen,  
analytische bijdragen aan artikelen over wachttijdtheorie,  
diverse kleinere activiteiten, zoals voordracht, refereering en consultancy.

Toelichting bij deze punten.

Ad 1.

Het in HJO2010\_1, 1.a, besproken rapport "Zernike circle polynomials and infinite integrals involving the product of Bessel functions", is omgewerkt naar een artikel, inmiddels geaccepteerd door J. European Optical Society, met de titel "New analytic results for the Zernike circle polynomials from a basic result in the Nijboer-Zernike diffraction theory". Er wordt met W. Coene in de gaten gehouden of en hoe de behaalde resultaten in rapport/artikel van nut kunnen zijn in een ASML-lithografische context. Door het geavanceerde karakter van het werk kan toepassing ervan nog even op zich laten wachten.

Er is een artikel, "Spatial impulse responses from a flexible baffled circular piston", geschreven met R. Aarts en ingediend bij J. Acoustical Society America. In dit artikel worden berekend de spatiële impulsresponsies in het akoestische veld van cirkelvormige luidsprekers en ultrasounddevices (mogelijke toepassing in medische ultrasound bij bloedsnelheidsmetingen). Het niet-uniforme snelheidsprofiel op het cirkelvormige membraan wordt in gedachte naar Zernike cirkelpolynomen ontwikkeld, en van elk dezer polynomen kan de bijdrage aan de spatiële impulsresponsies in eindige termen uitgedrukt worden door gebruik te maken van een additiefomule voor de cirkelpolynomen. Deze additiefomule kan met de methodes van het in 1.a genoemde rapport/artikel afgeleid worden, en generaliseert het welbekende additietheorema voor Legendrepolynomen (die optreden als het snelheidsprofiel radiaal-symmetrisch is).

Er is een generalisatie gegeven van de Zernike cirkelpolynomen waarbij het gedrag aan de rand van de eenheidsschijf voorgeschreven wordt als evenredig met  $(1-\rho^2)^\beta$  (hier  $\beta > -1$ ). Veel van de voor het klassieke geval  $\beta=0$  geldende resultaten hebben aantrekkelijke generalisaties naar de gevallen met  $\beta$  ongelijk 0. Dit geldt onder meer voor de 2D Fouriergetransformeerden (uit te drukken in zgn. Jinc-functies met door  $\beta$  bepaald afvalgedrag op oneindig), de Radongetransformeerde (uit te drukken in Gegenbauerpolynomen van de orde  $\beta+1$ ), en er zijn schalingsresultaten. Deze nieuwe basisfuncties zijn van nut als er een diffractie-integraal uitgerekend moet worden die een niet-uniformiteit bevat die aan de rand op voorgeschreven wijze naar nul gaat. Een andere toepassing van deze nieuwe basisfuncties gaat over het ontwerpen van tot de eenheidsschijf bandbegrensde functies van twee variabelen die als lijndetector in beelden moeten fungeren. Het is wenselijk dat deze functies snel afvallen, en dat kan bereikt worden door met lineaire combinaties van de nieuwe basisfuncties met voldoende grote  $\beta$  te werken. Het specifieke lijndetectorgedrag, geconcentreerd op een (vrij) smalle en (vrij) lange verzameling, kan bereikt worden door manipulatie van de ontwikkelingscoëfficiënten van de inverse Fouriergetransformeerde van de te ontwerpen detector naar de nieuwe basisfuncties. Dit werk is geïnitieerd in samenspraak met R. Duits en B. Janssen en gaat verder in 2011.

Ad 2.

Er is analytische ondersteuning gegeven aan A. Koolen (ASML, Metrology) bij het benaderen, en waar mogelijk, exact uitrekenen van diffractie-integralen onder partieel-coherente omstandigheden. We-

gens confidentialiteit kan ik niet verder ingaan op dit werk. Wel is er duidelijk enthousiasme en waardering voor mijn inbreng, en er wordt gekeken hoe we verder gaan.

#### Ad 3.

De in HJO2010\_1, 2(ii), (iv) genoemde manuscripten op het gebied van de wachttijdtheorie zijn geaccepteerd in de genoemde tijdschriften/ Proceedings, en (iii) verschijnt in een special issue van Performance Evaluation over MAMA2010 (satellietconferentie van SIGMETRICS'10) ((i) was al geaccepteerd en van (v) is nog geen bericht).

Er is een manuscript, "Achieving target throughputs in random-access networks", geschreven met P. van de Ven, S. Borst en J. van Leeuwaarden en ingediend voor presentatie op SIGMETRICS'11. Mijn belangrijkste bijdrage aan dit werk was het bewijzen van globale inverteerbaarheid van de ongenormaliseerde throughputfunctie en de één-éénduidigheid van de genormaliseerde throughputfunctie, alsmede enkele tips voor het numeriek inverteren van deze functies.

Als lopende activiteiten vallen te melden

Generalisatie van de in HJO2010\_1, 2(i) (Optimal tradeoff between exposed and hidden nodes in large wireless networks, Proc. ACM SIGMETRICS 2010) verkregen resultaten naar het geval dat transmissie naar willekeurige, en niet alleen naaste, buurnodes mag plaatsvinden. Dit werk wordt gedaan met P. van de Ven en J. van Leeuwaarden.

Het analyseren van de vergelijkingen, bevattende de Erlang-B uitdrukking, die optreden als er "corrected diffusion" benaderingen gemaakt worden voor retrial queues met groot aantal servers in het Half-in-Whitt regime. Hierbij speelt een resultaat van Cohen uit 1957 een centrale rol. De analyses van de welbekende Mills' ratio, zoals bijvoorbeeld gegeven door Sampford in 1952, moeten hierbij aangepast en verfijnd worden. Dit is werk met J. van Leeuwaarden en F. Avram (Universiteit Pau).

#### Ad 4. Als kleinere activiteiten vallen te melden

Voordracht "Some basic results in Gabor analysis", 22 september, 2010, EMaCs.

Diverse kleine adviezen aan J. Vissers (promovendus EE, CS) op het gebied van de analyse. Aangezien Vissers in de periode een externe stage deed, kon er niet veel aan Gaboranalyse voor het in HJO2010\_1, 3(iv) genoemde controlprobleem gedaan worden. Wel is er een oriënterende bijeenkomst geweest met S. Weiland, J. Vissers, R. Duits en ik met als thema: hoe kunnen er methodes uit de differentiaalgeometrie ingezet worden bij het vervormen van (continue en discrete) Gabortransformaties.

Het afschatten van de benaderingsfout van een grootheid in de buurt van een kritieke waarde (waar een integrand in het nominale geval ontploft); de grootheid bevat een onbekende matrix die op een redelijk bekende manier klein is. Dit probleem komt tevoorschijn in een Fourieranalytische aanpak bij berekeningen aan self-avoiding random walks (R. Fitzner, R. van de Hofstad).

Het eerste manuscript dat genoemd werd in HJO2010\_1, 3(v) in de samenwerking met TU-Delft, Optica, is verschenen als "From a discrete to a continuous model for interpulse interference with a frequency-comb laser", Phys. Rev. A82 023808 (2010). Het tweede artikel, "Time-frequency distribution of interferograms from a frequency comb in dispersive media", is ingediend bij Optics Express en is inmiddels dicht bij acceptatie. De co-auteurs voor beide artikelen zijn M. Zeitouny, M. Cui, N. Bhattacharya, S. van den Berg en H.P. Urbach.

## PUBLICATIONS

### Journal article

- Adan, I.J.B.F., Hurkens, C.A.J. & Weiss, G. (2010). A reversible Erlang loss system with multi-type customers and multi-type servers. *Probability in the Engineering and Informational Sciences*, 24(4), 536-548.
- Aidekon, E.F. & Shi, Z. (2010). Weak convergence for the minimal position in a branching random walk: A simple proof. *Periodica Mathematica Hungarica*, 61(1-2), 43-54.
- Al Hanbali, A. & Boxma, O.J. (2010). Busy period analysis of the state dependent M/M/1/K queue. *Operations Research Letters*, 38(1), 1-6.
- Albrecher, H., Ladoucette, S.A. & Teugels, J.L. (2010). Asymptotics of the sample coefficient of variation and the sample dispersion. *Journal of Statistical Planning and Inference*, 140(2), 358-368.
- Avena, L., Hollander, W.Th.F. den & Redig, F.H.J. (2010). Large deviation principle for one-dimensional random walk in dynamic random environment: attractive spin-flips and simple symmetric exclusion. *Markov Processes and Related Fields*, 16(1), 139-168.
- Bar-Lev, S.K., Boxma, O.J. & Letac, G. (2010). A characterization related to the equilibrium distribution associated with a polynomial structure. *Journal of Applied Probability*, 47(1), 293-299.
- Bar-Lev, S.K., Boxma, O.J., Stadje, W. & Duyn Schouten, F.A. van der (2010). A two-stage group testing model for infections with window periods. *Methodology and Computing in Applied Probability*, 12(3), 309-322.
- Birkner, M., Greven, A. & Hollander, W.Th.F. den (2010). Quenched large deviation principle for words in a letter sequence. *Probability Theory and Related Fields*, 148(3), 403-456.
- Blom, J.G. & Mandjes, M.R.H. (2011). Traffic generated by a semi-Markov additive process. *Probability in the Engineering and Informational Sciences*, 25(1), 21-27.
- Boon, M.A.A., Adan, I.J.B.F. & Boxma, O.J. (2010). A polling model with multiple priority levels. *Performance Evaluation*, 67(6), 468-484.
- Boon, M.A.A., Wijk, A.C.C. van, Adan, I.J.B.F. & Boxma, O.J. (2010). A polling model with smart customers. *Queueing Systems: Theory and Applications*, 66(3), 239-274.
- Boon, M.A.A., Adan, I.J.B.F. & Boxma, O.J. (2010). A two-queue polling model with two priority levels in the first queue. *Discrete Event Dynamic Systems*, 20(4), 511-536.
- Bovier, A., Hollander, W.Th.F. den & Spitoni, C. (2010). Homogeneous nucleation for Glauber and Kawasaki dynamics in large volumes at low temperatures. *The Annals of Probability*, 38(2), 661-713.
- Boxma, O.J., Jönsson, H., Resing, J.A.C. & Shneer, V. (2010). An alternating risk reserve process - Part I. *Markov Processes and Related Fields*, 16, 409-424.
- Boxma, O.J., Jönsson, H., Resing, J.A.C. & Shneer, V. (2010). An alternating risk reserve process - Part II. *Markov Processes and Related Fields*, 16, 425-446.
- Boxma, O.J., Kella, O. & Mandjes, M.R.H. (2010). On a generic class of Lévy-driven vacation models. *Probability in the Engineering and Informational Sciences*, 24(1), 1-12.
- Boxma, O.J., Perry, D., Stadje, W. & Zacks, S. (2010). The busy period of an M/G/1 queue with customer impatience. *Journal of Applied Probability*, 47(1), 130-145.
- Cantrijn, C.M.M. (2010). Honderdste Eurandom workshop. *Nieuw Archief voor Wiskunde*, 5/11(1), 19-19.
- Cheliotis, D. & Virág, B. (2010). The spectrum of the random environment and localization of noise. *Probability Theory and Related Fields*, 148(1), 141-158.
- D'Auria, B., Ivanovs, J., Kella, O. & Mandjes, M.R.H. (2010). First passage of a Markov additive process and generalized Jordan chains. *Journal of Applied Probability*, 47(4), 1048-1057.
- Debicki, K.G., Kosinski, K.M., Mandjes, M.R.H. & Rolski, T. (2010). Extremes of multidimensional Gaussian processes. *Stochastic Processes and their Applications*, 120(12), 2289-2301.
- Denisov, D.E. & Shneer, V. (2010). Global and local asymptotics for the busy period of an M/G/1 queue. *Queueing Systems: Theory and Applications*, 64(4), 383-393.
- Es, B. van & Gugushvili, S. (2010). Asymptotic normality of the deconvolution kernel density estimator under the vanishing error variance. *Journal of the Korean Statistical Society*, 39(1), 103-115.
- Fang, F., Jönsson, H., Oosterlee, C.W. & Schoutens, W. (2010). Fast valuation and calibration of credit default swaps under Lévy dynamics. *The Journal of Computational Finance*, 14(2), 57-86.
- Fralix, B.H. & Riaño, G. (2010). A new look at transient versions of Little's law, and M/G/1 preemptive Last-Come-First-Served queues. *Journal of Applied Probability*, 47(2), 459-473.
- Gandhi, A., Harchol-Balter, M. & Adan, I.J.B.F. (2010). Server farms with setup costs. *Performance Evaluation*, 67(11)(11), 1123-1138.
- Gärtner, J., Hollander, W.Th.F. den & Maillard, G. (2010). Intermittency on catalysts : voter model. *The Annals of Probability*, 38(5), 2066-2102.

- Gaudillière, A. & Nardi, F.R. (2010). An upper bound for front propagation velocities inside moving populations. *Brazilian Journal of Probability and Statistics*, 24(2), 256-278.
- Haviv, M., Kella, O. & Kerner, Y. (2010). Equilibrium strategies in queues based on time or index of arrival. *Probability in the Engineering and Informational Sciences*, 24(1), 13-25.
- Hofstad, R.W. van der, Janssen, A.J.E.M. & Leeuwaarden, J.S.H. van (2010). Critical epidemics, random graphs and Brownian motion with a parabolic drift. *Advances in Applied Probability*, 42(4), 1187-1206.
- Hollander, W.Th.F. den & Pétrélis, N.R. (2010). A mathematical model for a copolymer in an emulsion. *Journal of Mathematical Chemistry*, 48(1), 83-94.
- Ivanovs, J. & Mandjes, M.R.H. (2010). First passage of time-reversible spectrally negative Markov additive processes. *Operations Research Letters*, 38(2), 77-81.
- Ivanovs, J., Boxma, O.J. & Mandjes, M.R.H. (2010). Singularities of the matrix exponent of a Markov additive process with one-sided jumps. *Stochastic Processes and their Applications*, 120(9), 1776-1794.
- Kella, O. & Löpker, A.H. (2010). A Markov-modulated growth collapse model. *Probability in the Engineering and Informational Sciences*, 24(1), 99-107.
- Kella, O., Boxma, O.J. & Mandjes, M.R.H. (2010). On Lévy-driven vacation models with correlated busy periods and service interruptions. *Queueing Systems: Theory and Applications*, 64(4), 359-382.
- Kong, E., Linton, O. & Xia, Y. (2010). Uniform Bahadur representation for local polynomial estimates of M-regression and its application to the additive model. *Econometric Theory*, 26(5), 1529-1564.
- Ledovskikh, A., Danilov, D., Vermeulen, P. & Notten, P.H.L. (2010). Modeling of electrochemical hydrogen storage in metal hydride electrodes. *Journal of the Electrochemical Society*, 157(7), A861-A869.
- Leeuwaarden, J.S.H. van, Löpker, A.H. & Janssen, A.J.E.M. (2010). Connecting renewal age processes with M/D/1 and M/D/∞ queues through stick breaking. *Stochastic Models*, 26(1), 141-163.
- Leskelä, L., Robert, Ph. & Simatos, F. (2010). Interacting branching processes and linear file-sharing networks. *Advances in Applied Probability*, 42(3), 834-854.
- Löpker, A.H. & Perry, D. (2010). The idle period of the finite G/M/1 queue with an interpretation in risk theory. *Queueing Systems: Theory and Applications*, 64(4), 395-407.
- Masol, V. & Teugels, J.L. (2010). Numerical accuracy of real inversion formulas for the Laplace transform. *Journal of Computational and Applied Mathematics*, 233(10), 2521-2533.
- Nazarathy, J. & Weiss, G. (2010). Positive Harris recurrence and diffusion scale analysis of a push pull queueing network. *Performance Evaluation*, 67(4), 201-217.
- Nazarathy, Y. & Weiss, G. (2010). A fluid approach to large volume job shop scheduling. *Journal of Scheduling*, 13(5), 509-529.
- Sapozhnikov, A. (2010). Upper bound on the expected size of the intrinsic ball. *Electronic Communications in Probability*, 15, 297-298.
- Schreiber, T. & Lieshout, M.N.M. van (2010). Disagreement loop and path creation/annihilation algorithms for binary planar Markov fields with applications to image segmentation. *Scandinavian Journal of Statistics*, 37(2), 264-285.
- Silvestrov, D.S., Jönsson, H. & Stenberg, F. (2010). Convergence of option rewards for Markov type price processes modulated by stochastic indices. II. *Theory of Probability and Mathematical Statistics*, 80, 153-172.
- Simatos, F. & Tibi, D. (2010). Spatial homogenization in a stochastic network with mobility. *The Annals of Applied Probability*, 20(1), 321-355.
- Stadje, M.A. (2010). Extending dynamic convex risk measures from discrete time to continuous time: A convergence approach. *Insurance: Mathematics and Economics*, 47(3), 391-404.
- Ven, P.M. van de, Borst, S.C., Leeuwaarden, J.S.H. van & Proutière, A. (2010). Insensitivity and stability of random-access networks. *Performance Evaluation*, 67(11), 1230-1242.
- Walraevens, J., Leeuwaarden, J.S.H. van & Boxma, O.J. (2010). Power series approximations for two-class generalized processor sharing systems. *Queueing Systems: Theory and Applications*, 66(2), 107-130.

### Book chapter

Jönsson, B.H.B., Masol, V. & Schoutens, W. (2010). Normal inverse Gaussian model. In R. Cont (Ed.), *Encyclopedia of Quantitative Finance*. Wiley.

### Conference proceeding

Coffman, E.G., Robert, Ph., Simatos, F., Tarumi, S. & Zussman, G. (2010). Channel fragmentation in dynamic spectrum access systems : a theoretical study. In *Proceedings SIGMETRICS 2010 (New York NY, USA, June 14-18, 2010)* (pp. 333-344). ACM.

Ganesh, A., Lilenthal, S., Manjunath, D., Proutière, A. & Simatos, F. (2010). Load balancing via randomised local search in closed and open systems. In *Proceedings SIGMETRICS 2010 (New York NY, USA, June 14-18, 2010)* (pp. 287-298). ACM.

Leeuwaarden, J.S.H. van, Lefeber, A.A.J., Nazarathy, J. & Rooda, J.E. (2010). Model Predictive Control for the acquisition queue and related queueing networks. In *Proceedings of the 5th International Conference on Queueing Theory and Network Applications (QTNA 2010, Beijing, China, June 24-26, 2010)* (pp. 193-200). New York NY: ACM.

Ven, P.M. van de, Janssen, A.J.E.M. & Leeuwaarden, J.S.H. van (2010). Optimal tradeoff between exposed and hidden nodes in large wireless networks. In *Proceedings of the International Conference on Measurements and Modeling of Computer Systems (SIGMETRICS 2010, New York NY, USA, June 14-18, 2010) Vol. 38(1). Performance Evaluation Review* (pp. 179-190).

### External reports

Al Hanbali, A., Mandjes, M.R.H., Nazarathy, Y. & Whitt, W. (2010). *The asymptotic variance of departures in critically loaded queues*. CWI Report (Ext. rep. PNA-1003). Amsterdam: CWI.

Debicki, K.G., Kosinski, K.M., Mandjes, M.R.H. & Rolski, T. (2010). *Extremes of multidimensional Gaussian processes*. CWI Report (Ext. rep. PNA-1005). Amsterdam: CWI.

### Dissertation

Beekhuizen, P. (2010, February 4). *Performance analysis of networks on chips*. Technische Universiteit Eindhoven (153 pag.) (Eindhoven: Technische Universiteit Eindhoven). Prom./coprom.: prof.dr.ir. O.J. Boxma & dr. J.A.C. Resing.

Bruin, J. (2010, October 12). *Inventory control in multi-item production systems*. Technische Universiteit Eindhoven (140 pag.) (Eindhoven: Technische Universiteit Eindhoven). Prom./coprom.: prof.dr.ir. J. van der Wal & prof.dr. A.G. de Kok.

### EURANDOM Reports

Report No.	Title	Author(s)	Group
2010-053	<a href="#">Computationally efficient algorithms for statistical image processing. Implementation in R</a>	M. Langovoy O. Wittich	SIM
2010-052	<a href="#">The <math>\beta</math> Meixner model</a>	A. Ferreiro-Castilla W. Schoutens	MRM
2010-051	<a href="#">A Fluid EOQ Model of Perishable Items with Intermittent High and Low Demand Rates</a>	O.J. Boxma D. Perry S. Zacks	QPA
2010-050	<a href="#">Fairness and Efficiency for Polling Models with the k Gated Service Discipline.</a>	A.C.C. van Wijk I. Adan O.J. Boxma A. Wierman	QPA
2010-049	<a href="#">Robust nonparametric detection of objects in noisy images.</a>	M. Langovoy O. Wittich	SIM
2010-048	<a href="#">Parabolic Anderson model with voter catalysts: maximality of the annealed asymptotics</a>	G. Maillard T. Mountford S. Schöpfer	RSS
2010-047	<a href="#">Parabolic Anderson model with a finite number of moving catalysts</a>	F. Castell O. Gün G. Maillard	RSS
2010-046	<a href="#">Quenched Lyapunov exponent for the parabolic Anderson model in a dynamic random environment</a>	J. Gärtner F. den Hollander G. Maillard	RSS
2010-045	<a href="#">Quantitative assessment of securitisation deals</a>	H. Jönsson W. Schoutens	MRM
2010-044	<a href="#">Performance Analysis of Production Lines with Continuous Material Flows and Finite Buffers</a>	R. Bierbooms I. Adan M. van Vuuren	QPA

2010-043	<a href="#">Delays at signalised intersections with exhaustive traffic control</a>	M. Boon I. Adan E. Winands D. Down	QPA
2010-042	<a href="#">Relations between invasion percolation and critical percolation in two dimensions}</a>	M. Damron A. Sapozhnikov B. Vágvölgyi	RSS
2010-041	<a href="#">Outlets of 2D invasion percolation and multiple-armed incipient infinite clusters</a>	M. Damron A. Sapozhnikov	RSS
2010-040	<a href="#">Limit theorems for 2D invasion percolation</a>	M. Damron A. Sapozhnikov	RSS
2010-039	<a href="#">Ruin Excursions, the <math>G/G/\infty</math> queue and tax payments in renewal risk models</a>	H. Albrecher S.C. Borst O.J. Boxma J. Resing	QPA
2010-038	<a href="#">Log-Harnack Inequality for Stochastic Burgers Equations and Applications</a>	F. Wang J. Wu X. Lihu	RSS
2010-037	<a href="#">Derivative Formula and Applications for Hyperdissipative Stochastic Navier-Stokes/Burgers Equations</a>	F. Wang X. Lihu	RSS
2010-036	<a href="#">Two Perishable Inventory Systems with One-way Substitution</a>	L. Liu I. Adan D. Perry	QPA
2010-035	<a href="#">Upper bound on the expected size of intrinsic ball</a>	A. Sapozhnikov	RSS
2010-034	<a href="#">Deconvolution for an atomic distribution: rates of convergence</a>	G. Gugushvili B. van Es P. Spreij	SIM
2010-033	<a href="#"><math>\sqrt{n}</math>-Consistent parameter estimation for systems of ordinary differential equations: bypassing numerical integration via smoothing</a>	G. Gugushvili C.A.K. Klaassen	SIM
2010-032	<a href="#">Convergence of the all-time supremum of a Levy process in the heavy-traffic regime</a>	K.M. Kosinski  O.J. Boxma B. Zwart	QPA
2010-031	<a href="#">Implied Liquidity; Towards stochastic liquidity modeling and liquidity trading</a>	J.M. Corcuera F. Guillaume D.B. Madan W. Schoutens	MRM
2010-030	<a href="#">Modeling of Electrochemical Hydrogen Storage in Metal Hydride Electrodes</a>	A. Ledovskikh D. Danilov P. Vermeulen P.H.L. Notten	SIM
2010-029	<a href="#">Applications of Polling Systems</a>	M.A.A. Boon R.D. v.d. Mei E.M.M. Winands	QPA
2010-028	<a href="#">Conic Coconuts; The Pricing of Contingent Capital Notes using Conic Finance</a>	D.B. Madan W. Schoutens	MRM
2010-027	<a href="#">A reversible loss system with multi-type customers and multi-type servers</a>	I. Adan C. Hurkens G. Weiss	QPA
2010-026	<a href="#">Model and calibration risks for the Heston model</a>	F. Guillaume W. Schoutens	MRM
2010-025	<a href="#">Exact FCFS matching rates for two infinite multi-type sequences</a>	I. Adan G. Weiss	QPA
2010-024	<a href="#">Variational characterization of the critical curve for pinning of random polymers</a>	D. Cheliotis F. den Hollander	RSS

2010-023	<a href="#">A large-deviation view on dynamical Gibbs-non-Gibbs transitions</a>	A. van Enter R. Fernande F. den Hollander F. Redig	RSS
2010-022	<a href="#">A Model Predictive Control for the Acquisition Queue and Related Queueing Networks</a>	J. van Leeuwen E. Lefeber Y. Nazarathy J. Rooda	QPA
2010-021	<a href="#">Extremes of multidimensional Gaussian processes</a>	K. Debicki K. Kosinski M. Mandjes T. Rolski	QPA
2010-020	<a href="#">Entropy Coherent and Entropy Convex Measures of Risk</a>	R.J. Laeven M. Stadje	MRM
2010-019	<a href="#">A dynamic control strategy for multi-item production systems with backlog; part 2</a>	J. Bruin J. van der Wal	QPA
2010-018	<a href="#">A cyclic production scheme for multi-item production systems with backlog; part 1</a>	J. Bruin J. van der Wal	QPA
2010-017	<a href="#">Server farms with setup costs</a>	A. Gandhi M. Harchol-Balter I. Adan	QPA
2010-016	<a href="#">Collision local time of transient random walks and intermediate phases in interacting stochastic systems</a>	M. Birkner A. Greven F. den Hollander	RSS
2010-015	<a href="#">Optimal Tradeoff Between Exposed and Hidden Nodes in Large Wireless Networks</a>	P. v.d. Ven A. Janssen J. v. Leeuwen	QPA
2010-014	<a href="#">Approximate Analysis of Single-Server Tandem Queues with Finite Buffers</a>	R. Bierbooms I. Adan M. v. Vuuren	QPA
2010-013	<a href="#">A New Look at Organ Transplantation Models and Double Matching Queues</a>	O. Boxma I. David D. Perry W. Stadje	QPA
2010-012	<a href="#">On some tractable growth collapse processes with renewal collapse epochs</a>	O. Boxma O. Kella D. Perry	QPA
2010-011	<a href="#">A key large deviation principle for interacting stochastic systems</a>	F. van Hollander	RSS
2010-010	<a href="#">Extending Dynamic Convex Risk Measures from Discrete Time to Continuous Time: a Convergence Approach</a>	M. Stadje	MRM
2010-009	<a href="#">Conic Financial Markets and Corporate Finance</a>	D. Madan W. Schoutens	MRM
2010-008	<a href="#">Existence and exponential mixing of infinite white <math>\alpha</math>-stable systems with unbounded interactions</a>	L. Xu B. Zegarlinski	RSS
2010-007	<a href="#">Exponential mixing of the 3D stochastic Navier-Stokes equations driven by mildly degenerate noises</a>	S. Albeverio A. Debussche L. Xu	RSS
2010-006	<a href="#">Ergodicity of the 3D stochastic Navier-Stokes equations driven by mildly degenerate noise</a>	M. Romito L. Xu	RSS
2010-005	<a href="#">Ergodicity of infinite white <math>\alpha</math>-stable systems with linear and bounded interactions</a>	L. Xu	RSS
2010-004	<a href="#">A reversible loss system with multi-type customers and multi-type servers</a>	I. Adan C. Hurkens G. Weiss	QPA
2010-003	<a href="#">Use a reduced Heston or reduce the use of Heston?</a>	F. Guillaume W. Schoutens	MRM

2010-002	<a href="#">The M/G/1+G queue revisited</a>	O. Boxma D. Perry W. Stadje	QPA
2010-001	<a href="#">The Asymptotic Variance of Departures in Critically Loaded Queues</a>	A. Al Hanbali M. Mandjes Y. Nazarathy W. Whitt	QPA

In 2010 53 **EURANDOM reports** were written, while the website of the department of Mathematics and Computer Sciences mentions 59 **external publications**.

[http://oametuep.uci.ru.nl/metue/pk\\_apa\\_n.onderzoek?p\\_url\\_id=5205](http://oametuep.uci.ru.nl/metue/pk_apa_n.onderzoek?p_url_id=5205)

**Distribution per programme:**

	EURANDOM Reports	Journals	external reports	conference proceedings	Book Chapter	Disser- tation
QPA	22	30	2	4		2
RSS	17	10				
SIM	5	3				
MRM	9	5			1	
Bat/NiMH		1				
General		1				
	<hr/> 53	<hr/> 50	<hr/> 2	<hr/> 4	<hr/> 1	<hr/> 2

## ACTIVITIES

### Workshops and Conferences in 2010

December 13-16, 2010 (RSS)  
ESF-EMS-ERCOM workshop  
[Combinatorics and Analysis in Spatial Probability](#)

November 25-27, 2010 (QPA)  
[YEQT IV workshop "Optimal Control in Stochastic Systems"](#)

November 8-10, 2010 (SIM)  
[YES-IV workshop "Bayesian Nonparametric Statistics"](#)

October 22, 2010, KU Leuven (MRM)  
EIBURS Workshop  
[Asset backed securities: The march forward](#)

September 29 - October 1 (QPA)  
[Second Dutch-Israel workshop](#)

June 24 & 25, 2010 ([LOIS](#)/QPA)  
[Stochastic Models for Manufacturing Systems](#)

April 13-16, 2010 Hosed  
[Workshop "Nonlinear Dynamics of Natural Systems+ "](#)

March 8-13, 2010 (RSS)  
[YEP-VII "Probability and Algorithms"](#)

EURANDOM organized a lecture day on the occasion of 1-year STAR cluster  
December 3, 2010  
First anniversary [STAR](#)

### Details on the workshops

**March 8-13, 2010 (RSS)**  
**YEP-VII "Probability and Algorithms"**

#### Organizers:

- Nina Gantert - Professor of Mathematics, Universität Münster
- Ralph Neininger - Professor of Mathematics, Universität Frankfurt

**Participants: 48**

#### Summary

This workshop is the seventh in a successful series of YEP meetings taking place at Eurandom in the past years, each devoted to a different topic representing a topical development in probability. Topics are chosen by a steering committee headed by Remco van der Hofstad (Eindhoven) and each of the recent workshops was jointly organised by a member of the steering committee and another researcher. This year, the main focus of the workshop will be on "Probability, random trees and algorithms". Random trees and probabilistic structures have been considered for a long time, starting with the pioneering work of Erdős and Renyi in the 1960s. In particular, random trees, which are of independent interest in probability in the context of branching processes, occur as search trees in computer science. Hence, the analysis of random trees is at the intersection of probability theory, computer science and combinatorics. Random probabilistic structures have also been studied from a computational perspective, where "threshold phenomena" are observed in the sense that solving a random problem is either "very easy" or "extremely difficult". There are new, exciting connections with the theory of spin

glasses, bringing in ideas of statistical physics. In the workshop we will focus on such new mathematical developments and their connection with probability theory.

**Sponsors:**

- European Science Foundation
- Technische Universiteit Eindhoven
- Nederlandse organisatie voor Wetenschappelijk Onderzoek
- EURANDOM

**April 13-16, 2010**

**Workshop "Nonlinear Dynamics of Natural Systems+ "**

**Organizers:**

- Henk Broer, University of Groningen
- Arjen Doelman, CWI, University of Amsterdam
- Aad van der Vaart, VU Amsterdam
- Sjoerd Verduyn Lunel, University of Leiden

**Participants: 57**

**Summary**

Five years ago, the Dutch Mathematics Cluster "Nonlinear Dynamics of Natural Systems+ " kicked off with a program of research with the aim 'to disentangle how observed phenomena relate to underlying mechanisms and to make predictions about concrete systems'. The new appointments, advisorships, workshops, colloquia, and many other activities within this cluster have created a buzz of activity around this common goal.

With this workshop we celebrate the fifth year of this Mathematics Cluster. The workshop will highlight the beautiful and interesting research that has been done in the past five years, and at the same time look ahead towards the future. Combining many speakers from the cluster with a number of high-profile external speakers, we aim to make this workshop a celebration of science and a showcase of applied mathematics.

**June 24 & 25, 2010 (LOIS/QPA)**

**Stochastic Models for Manufacturing Systems**

**Organizers:**

- I.J.B.F. Adan, TU/e, University of Amsterdam
- P. Etman, TU/e
- A.A.J. Lefeber, TU/e

**Participants: 53**

**Summary:**

In manufacturing systems, throughput and flow time are key performance metrics. Throughput refers to the number of finished parts per unit of time and flow time refers to the time a part needs to go through the complete sequence of process operations. For a successful performance improvement, insight in the main factors that are responsible for capacity losses is essential. Typically, the focus is on utilization, but in doing so, one may overlook opportunities for performance improvement by reduction of variability. Stochastic models attempt to quantify both utilization and variability and have proven their value in practical operations and decision making. In particular, progress has been made in the development and application of aggregate modeling approaches, which are, from an operational point of view, very effective, since they do not require to identify all sources in detail that contribute to capacity losses.

The objective of this workshop is to give an overview of recent research in performance analysis of manufacturing systems with an emphasis on stochastic modeling, including both analytical and simulation models.

**Sponsors:**

- LOIS
- STW

**September 29 - October 1 (QPA)  
Second Dutch-Israel workshop**

**Organizers:**

- Prof.dr.ir. I.J.B.F. Adan, TU/e, University of Amsterdam
- Prof.dr.ir. O. Boxma, TU/e, EURANDOM
- Prof.dr.ir. G.J.J.A.N. van Houtum, TU/e

**Participants: 44**

**Summary:**

June 3-4, 2009, the first Israeli-Dutch workshop on queueing theory was organized, in Haifa. Ten Dutch researchers participated. The workshop was considered to be a big success; there were excellent talks, and the ensuing discussions led to a considerable strengthening of the ties between the Israeli and Dutch queueing communities, two communities which both are relatively large, strong and active. As a result, several Dutch researchers have recently been invited to visit Israeli universities, and new collaborations have begun.

Motivation: The purpose of this second workshop is to further strengthen the ties between both communities, and facilitate further collaboration and joint projects. The workshop will also establish more ties between researchers from the OPAC group and Israeli OR specialists.

**Sponsors:**

- LOIS
- Nederlandse organisatie voor Wetenschappelijk Onderzoek
- Technische Universiteit Eindhoven
- Beta
- EURANDOM

**October 22, 2010, KU Leuven (MRM)**

**EIBURS Workshop**

**Asset backed securities: The march forward**

**Organizers:**

- Wim Schoutens
- Henrik Jönsson

**Participants: 30**

**Summary:**

This workshop brings together researchers, practitioners and policy makers to discuss the lessons to be learnt from the financial crisis and how to move forward regarding asset backed securities (ABSs) and securitization in general. Topics like, Quantitative Modeling, standardization of ABSs, the role of ABS in the crisis and in the recovery, rating of ABSs and the related sensitivity analysis will be addressed.

**Sponsors:**

- Katholieke Universiteit Leuven
- European Investment Bank
- EURANDOM

**November 8-10, 2010 (SIM)**

**YES-IV workshop "Bayesian Nonparametric Statistics"**

**Organizers:**

- dr. B.J.K.Kleijn, Korteweg-De Vries Instituut voor Wiskunde, Amsterdam
- dr. I. Castillo, CNRS, Laboratoire Probabilités et Modèles Aléatoires, Paris
- Prof. dr. G. Jongbloed, University of Technology, Delft

**Participants: 41**

**Summary:**

Bayesian Nonparametrics is a rapidly growing field at the interface of statistics, probability theory and machine learning. While the Bayes approach is a very general and powerful inference tool (also naturally allowing to include prior information, to treat hierarchies of unknown parameters etc.), its use in nonparametric settings where potentially infinitely many parameters are unknown, turns out to be an exciting and challenging task. At the same time, the recent development of powerful simulation algorithms and the increase of computational power have given a strong impulse to the practical use of Bayesian methods.

The research topics range from the construction of prior distributions on very high dimensional spaces to inference based on the posterior distribution, from establishing consistency of the convergence to the determination of rates and limit shapes of posterior distributions. Recent advances have led to a rapidly growing literature and increasing application of nonparametric Bayesian techniques in a wide range of fields ranging from machine learning to applications in biostatistics and financial mathematics.

The present workshop is directed at young statisticians, in particular Ph.D. students, postdocs and junior researchers, who are interested in the subject of Bayesian Nonparametrics.

**Sponsors:**

- STAR
- Nederlandse organisatie voor Wetenschappelijk Onderzoek
- Technische Universiteit Eindhoven
- EURANDOM

**November 25-27, 2010 (QPA)****YEQT IV workshop "Optimal Control in Stochastic Systems"****Organizers:**

- Sandjai Bhulai, VU University of Amsterdam,
- Alaa Elwany, TU/e

**Participants: 33****Summary:**

Optimal control in stochastic systems is increasingly demanding more research due to their complexity and the inherent randomness encountered within their scopes. A wide variety of mathematical frameworks have been developed to enhance the optimal control of stochastic systems. The focus has been primarily on investigating appealing structures of the optimal policies in various application domains. The importance of optimal policy structures is twofold; first they provide valuable insight regarding the behavior of the system through easy-to-interpret optimal policies, such as control limit policies. Second, they can be exploited to develop computationally efficient solution algorithms to compute the optimal policies. Optimal control of stochastic systems is of crucial importance across numerous application domains such as manufacturing and production systems, service systems, communication systems, healthcare systems, and logistics.

This workshop aims to bring together both young and well experienced researchers, active in the field of optimal control in stochastic systems, broadly defined. The workshop includes keynote speakers, tutorials and invited presentations by renowned researchers. It is the fourth in the series Young European Queueing Theorists (YEQT), organized within the framework of EURANDOM's Queueing and Performance Analysis program. The first meeting was devoted to transient and asymptotic analysis of queueing systems, the second one focused on the stochastic analysis of modern communication networks, and the third one for Scheduling and Resource Sharing in Queueing Networks.

**Sponsors:**

- STAR
- LOIS
- Nederlandse organisatie voor Wetenschappelijk Onderzoek
- Technische Universiteit Eindhoven
- EURANDOM

**December 13-16, 2010 (RSS)**  
**ESF-EMS-ERCOM workshop**  
**Combinatorics and Analysis in Spatial Probability**

**Organizers:**

- Professor Dr. J. van den Berg - CWI/VU Amsterdam
- Professor W. Werner - Université Paris-Sud and Ecole Normale Supérieure

**Participants: 83**

**Summary:**

Random Spatial Processes, in particular Percolation, Interacting Particle Systems and Gibbs Measures, has become one of the most active subfields of modern Probability. Motivated by problems in Physics (phase transitions), Biology (epidemics) and, more recently, Computer Science (randomized algorithms, 'cooperative' phenomena in large communication networks), it has led to deep, fundamental mathematical research. Much of the rapid and successful development in this area is due to a remarkable combination of probabilistic, combinatorial and (complex) analytic techniques.

**Sponsors:**

- European Mathematical Society
- European Research Centres on Mathematics
- EURANDOM

QPA	3
RSS	2
SIM	1
MRM	1
Total	<hr/> 7

**Total number of participants: 359** excluding EIB-participants

## Lectures and Seminars

### January

January 6, 2010, 11.30-12.30 h. Informal meeting Eindhoven statisticians  
Rui Castro, Colombia, NY  
*Active Learning and Selective Sensing: closing the loop between data analysis and acquisition*

January 11, 2010, 16.15-17.00 h. (LOIS)  
Lois-lecture (IV)  
D. Bertsimas (MIT)  
*On the power of robust solutions in multi-stage stochastic and adaptive optimization*

January 13, 2010, 11.30-12.30 h. Informal meeting Eindhoven statisticians  
*Open problem session*

January 15, 11.00-12.00 h. (QPA)  
Shelley Zacks, University Binghamton, NY, USA  
*Generalized Integrated Telegrapher Process*

January 20, 2010, 11.30-12.30 h., Informal meeting Eindhoven statisticians  
*Open problem session*

January 22, 2010, 14.00-15.30 h. (QPA)  
M. Parlar, McMaster University  
*Operations Research with Maple: Methods and Models*

January 27, 2010, 11.30-12.30 h., Informal meeting Eindhoven statisticians  
Olaf Wittich, TU/e  
*Insect vision, signal detection and percolation*

### February

February 1, 2010, 10.15-17.00 h. (CHAIR)  
MINI-COURSE by EURANDOM Chair  
Professor Dilip Madan, Robert H. Smith School of Business, University of Maryland College Park, USA  
*Stochastic Processes in Financial Applications*

February 2, 15.00-16.00 h. (QPA)  
David Perry, University of Haifa, IL  
*A New Look at Organ Transplantation Models and Double Matching Queue*

February 2, 11.00-12.00 h. (EPPS)  
Florence Guillaume, EURANDOM  
*Implied Lévy volatility*

February 3, 2010, 11.30-12.30 h., Informal meeting Eindhoven statisticians  
*Open problem session*

February 10, 2010, 11.30-12.30 h., Informal meeting Eindhoven statisticians  
*Open problem session*

February 18, 2010, 15.00-16.00 h. (QPA)  
Gideon Weiss, University of Haifa  
*Queuing systems with multi-type jobs and multi-type servers under FCFS discipline*

February 17, 2010, 11.30-12.30 h., Informal meeting Eindhoven statisticians  
*Open problem session*

February 18, 2010, 14.00-15.00 h. (QPA)  
Ken Duffy, Hamilton Institute, National University of Ireland  
*How hard is it to estimate a large deviations rate function or Loynes' exponent?*  
15.00-16.00 h., LG 1.105

February 23, 11.00-12.00 h. (EPPS)  
Lihu Xu, EURANDOM  
*An introduction to Malliavin calculus*

February 26, 11.00-12.00 h. (RSS)  
B. Scoppola, Università degli Studi di Roma Tor Vergata  
*Queueing systems with pre-scheduled random arrivals*

## March

March 3, 2010, 11.30-12.30 h., Informal meeting Eindhoven statisticians  
Jan Draisma, TU/e, Discrete Mathematics Group  
*Trek separation for Gaussian graphical models*

March 15 & 16, 2010  
Dortmund-Eindhoven, two-day meeting  
*Homogenization of Prandtl-Reuss plasticity equations*

March 19, 2010, 14.00-15.00 h. (RSS)  
Maren Eckhoff, Technical University of Munich  
*Random walks in a random environment on the positive integers*

March 24, 2010, 11.30-12.30 h., Informal meeting Eindhoven statisticians  
Marc Aoun, Philips  
*Real-time Sensor Networking under overload Conditions*

March 31, 2010, 11.30-12.30 h. Informal meeting Eindhoven statisticians  
Daan Crommelin, CWI

## April

April 7, 2010, 11.30-12.30 h., Informal meeting Eindhoven statisticians  
Arnoud den Boer, CWI  
*Simultaneously Learning and Optimizing*

April 13, 2010, 10.00-11.00 h., (MRM)  
Abhimanyu Mitra, Department of OR&IE, Cornell University, Ithaca, NY  
*Two problems in tail probability estimation*

April 13, 2010, 11.00-12.00 h. (QPA)  
A. Elwany, TU/e - IE&IS  
*Structured Maintenance Policies for Systems with Complex Degradation Processes and Dedicated Sensors*

April 20, 2010 11.30-12.30 h., Informal meeting Eindhoven statisticians  
Birgit Witte, Delft University of Technology  
*Consistent Estimators in the Current Status Continuous Mark Model*

April 21, 2010, 14.00-15.00 h., LG 1.110 (QPA)  
Kilian Raschel, Paris VI  
*Counting walks in a quadrant: a unified approach via boundary value problems*

April 27, 2010, 11.30-12.30 h., LG 1.105, Informal meeting Eindhoven statisticians  
*Open problem session*

April 27, 2010, 13.30–14.30 h. (EPPS)  
Elie Aidekon, EURANDOM

April 29, 2010, 13.30 – 14.30 h. (EPPS)  
Anton Klimovski, EURANDOM

## May

May 12, 2010 11.00-11.30 h. (RSS)  
Robert Fitzner, TU/e  
*Lace expansion for dummies*  
11.30-12.00 h. Tim Hulshof, TU/e  
*...on current research...*

May 21, 2010, 11.00-12.00 h. (QPA)  
Ananth Krishnamurthy, University of Wisconsin-Madison, USA  
*Integrating Advanced Demand Information in Kanban Controlled Systems*

May 25, 2010, 14.00-15.00 h. (MRM)  
Alexander Herbertsson, University of Gothenburg, Sweden  
*Pricing basket default swaps in a tractable shot-noise model*

May 25, 2010, 11.30-12.30 h., Informal meeting Eindhoven statisticians  
*Open problem session*

May 28, 2010, 11.00-12.00 h. (QPA)  
Yoshitaka Takahashi, Waseda University, Tokyo, Japan  
*A single-server queueing system with modified service mechanism*

## June

June 1, 2010, 14.00-15.00 h. (EPPS)  
Guido Janssen, EURANDOM  
*Analytic problem solving for Eurandom*

June 2, 2010, 11.30-12.30 h. (MRM)  
Sami Umut Can, Cornell University, Ithaca USA  
*Random Rewards, Brownian Additive Functionals and Stable Self-Similar Processes*

June 8, 2010, 11.30 - 12.30 h., Informal meeting Eindhoven statisticians  
*Open problem session*

June 15, 2010, 11.30 - 12.30 h., Informal meeting Eindhoven statisticians  
Marie-Colette van Lieshout, CWI - TU/e  
*Image Segmentation by Polygonal Markov Fields*  
(includes joint work with R. Kluczynski and T. Schreiber)

June 22, 2010, 11.30-12.30h., Informal meeting Eindhoven statisticians  
*Open problem session*

June 22, 2010, 11.00-12.00 h. (QPA)  
Yoni Nazarathy, EURANDOM  
*Using Scaling Limits to approximate the stationary distributions of cyclically varying birth-death processes*

June 23, 2010, 10.45-11.45 h. (QPA)  
Marvin Steyaert, TUE Eindhoven, The Netherlands  
*Stochastic modeling of intracellular signaling and regulation*

June 29, 2010, 10.30-11.30 h., Informal Meetings Statisticians and Probabilists  
Marios Pavlides, Frederick University, Nicosia, Cyprus  
*Two Statistical Vignettes: Simpson's Paradox and Shaved Dice*

June 29, 2010, 11.45-12.45 h., Informal Meetings Statisticians and Probabilists  
Yvo Pokern, University College London, United Kingdom  
*Nonparametric Drift Estimation for Stochastic Differential Equations*  
(joint work with O. Papaspiliopoulos, G. O. Roberts and A. M. Stuart)

## July

July 8, 2010, 11.30-12.30 h., Informal Meetings Statisticians and Probabilists  
Alessandro Di Bucchianico, TUE Eindhoven, The Netherlands  
*Update of a Discussion on the use Classification Methods*

July 20, 2010, 10.30-11.30 h. (QPA)  
Brian Fralix, Clemson University, USA  
*Some new insights into the Wiener-Hopf factorization*

## August

August 24, 2010, 10.30- 11.30 h (QPA)  
Open Problem Session

Elie Aidekon (EURANDOM - RSS)  
*Limit Theorems for Galton-Watson Processes*  
Florian Simatos (CWI / EURANDOM - QPA)  
*Stability and fluid limits of stochastic networks with mobility*

## September

September 28, 2010, 14.00 - 15.00 h., LG 1.105 (EPPS)  
Andrea Krajinina  
*...on current research...*

September 7, 2010, 11.30- 12.30 h., Informal Meetings Statisticians and Probabilists

September 14, 2010, 11.30-12.30 h., Informal Meetings Statisticians and Probabilists  
Ismaël Castillo (CNRS, LPMA Paris)  
*Bayesian semiparametrics using Gaussian process priors*

September 21, 11.30 - 12.30 h., Informal Meetings Statisticians and Probabilists  
Kees van Hee and Natalia Sidorova (TU/e, Computer Science)  
*How large should a log file be to discover its process model?*

September 22, 15.30 - 16.30 h.  
EMaCs (Eindhoven Mathematics Colloquiums)  
Guido Janssen (TU/e, EURANDOM)  
*Some basic results in Gabor analysis*  
(followed by a social drink in the ante-room to the green room.)  
Organized by F. Nardi

September 28, 11.30-12.30 h., Informal Meetings Statisticians and Probabilists  
Riu Castro (TU/e)  
*Signal processing, learning theory and statistics*

## October

October 1, 2010, 16.00-17.00 h.  
LOIS lecture  
Prof. A. Mandelbaum  
*Service Engineering: Data-Based Science in support of Service Management, or "Empirical Adventures in Call-Centers and Hospitals"*

October 5, 2010, 11.30-12.30 h. (QPA)  
Florin Avram (Université de Pau)  
*On two symbolic-numeric approaches for retrial queues*

October 12, 2010, 11.30-12.30 h., Informal Meetings Statisticians and Probabilists  
Bart Janssen;  
Alessandro Di Bucchianico (TU/e LIME)

October 28, 2010, 14.00-15.00 h. (EPPS)  
Sandra Kliem  
*Interacting Particle Systems*

October 28, 2010, 10.00-11.00 h. (QPA)  
*Open problem session*  
Johan van Leeuwen  
Yoni Nazarathy

### **November**

November 4, 2010, 14.00-15.00 h. (EPPS)  
Yoni Nazarathy  
*A bit on the Linear Complementarity Problem*

November 10, 2010 14.30 - 15.30 h. (RSS)  
Andrey Dorogovtsev  
*Stochastic flows*

November 15, 2010, 16.00 - 17.00 h. (QPA)  
Tuan Phung-Duc ((Japan Society for Promotion of Science)  
*Analytical and Numerical Solutions for Multiserver Retrial Queues*

November 16, 2010, 11.30 - 12.30 h. (MRM)  
Florin Avram (Université de Pau)  
*Some exact and asymptotic results for the first passage-time distribution of Kolmogorov jump-diffusions*  
(joint work with Nikolai Leonenko, Landy Rabehasaina and Nenad Suvak)

November 16, 2010, 10.30 - 11.30 h. (MRM)  
Albert Ferreiro Castilla (Universitat Autònoma de Barcelona)  
*Inversion of Analytic Characteristic Functions and Infinite Convolutions of Exponential and Laplace Densities*

### **December**

December 1, 2010, 13.30 - 14.30 h. (RSS)  
Bernd Metzger (WIAS-Berlin)  
*The parabolic Anderson model: The asymptotics of the statistical moments and Lifshitz tails revisited*

December 2, 2010 (MRM)  
Meeting Scientific Council EURANDOM  
*Lectures*

December 2, 2010, 16.00 - 17.00 h. (LOIS)  
LOIS Lecture series  
Paul Zipkin (Duke University, Durham, USA)  
*Supply Streams*

December 8, 2010, 10.00 - 11.00 h. (MRM)  
Dorota Kurowicka (Delft University of Technology)  
*Regular Vines - New developments*

December 9, 2010, 16.00 - 17.00 h.(LOIS)

LOIS Lecture series

Aris Gionis (Yahoo! Research, Barcelona)

*The community-search problem and how to plan a successful cocktail party*

December 21, 2010, 11.30 - 12.30 h. (SIM)

Informal Meetings Statisticians and Probabilists

Subhasis Ghoshal (EURANDOM Chair)

*Reference Prior for Large Parameter Spaces*

In 2010 EURANDOM organized the following seminar series:

**Queueing and Performance Analysis (QPA): 22**

QPA seminar: 14

Problem session: 4

LOIS lectures: 4

**Random Spatial Structures (RSS): 6**

**Statistical Information and Modelling (SIM) /Informal meetings Eindhoven statisticians: 24**

**Multivariate Risk Modelling (MRM): 7**

**General: 11**

EURANDOM Postdoc and PhD seminar (EPPS): 9

Lectures by the EURANDOM Chair: 2

## EURANDOM visitors in 2010

	<b>December</b>	
S. Ghoshal (North Carolina State University)	Dec 13 - Jan. 8	CHAIR
H.J. Albrecher (Université de Lausanne)	Dec 2 - 3	MRM
	<b>November</b>	
B. Metzger (Berlin-Leipzig Forschergruppe)	Nov 29 - Dec 3	RSS
G. Miermont (Université Paris-Sud)	Nov 17 - Nov 19	RSS
T. Phung-Duc (Kyoto University, Japan)	Nov 8 - Dec 3	QPA
N. Pétrélis (University of Nantes)	Nov 7 - Nov 26	RSS
	<b>October</b>	
J. Berestycki (Université Pierre et Marie Curie)	Oct 4 - Oct 9	RSS
	<b>September</b>	
A. Ferreiro-Castilla (Universitat Autònoma de Barcelona, S)	Sep 22-Dec. 23	MRM
G. Iacobelli (Rijksuniversiteit Groningen)	Sep 20 - Dec 1	RSS
I. Castillo (Laboratoire de Probabilités et Modèles Aléatoires, Paris)	Sep 6-9 + 14	SIM
F. Avram (Universite de Pau, FR)	Sep 9 - Dec 3	QPA
G. Maillard (Université Aix-Marseille, FR)	Sep 1 - Aug 31, 2011	RSS
	<b>August</b>	
G. Weiss (University of Haifa, IL)	Aug 29 - Sep 3	QPA
Z. Palmowski (Mathematical Institute University of Wroclaw, PL)	Aug 23 - Aug 30	QPA
S. Shneer (Ecole Polytechnique Fédérale de Lausanne, Switzerland)	Aug 23 - Aug 26	QPA
K. Raschel (Université Paris VI, FR)	Aug 19 - Aug 25	QPA
D. Perry (University of Haifa, Israel)	Aug 3 - Sept 9	QPA
O. Kella ( The Hebrew University of Jerusalem, Israel)	Aug 1 - Sept 2	QPA
	<b>June</b>	
Y. Pokern (University College London, UK)	June 29 - July 2	SIM
M. Pavlides (Frederick University, Cyprus)	June 28 - June 30	SIM
	<b>May</b>	
Y. Takahashi (Waseda University, Tokyo, Japan)	May 27-28	QPA
A. Herbertsson (University of Gothenburg, S)	May 18-26, 2010	MRM
S. Bhamidi (University of North Carolina, USA)	May 17-July 12	RSS
A. Krishnamurthy (University of Wisconsin-Madison, USA)	May 17-21, 2010	QPA

<b>April</b>		
P. Glynn (Stanford University, USA) CANCELLED	April 21-23	QPA
E. Cirillo (Università degli Studi di Roma " La Sapienza", I)	April 20-30, 2010	RSS
K. Raschel (Université Paris VI, FR)	April 19-23	QPA
D. Down (McMaster University, CA)	April 12-14	QPA
<b>March</b>		
N. Bouman (Universiteit Twente, NL)	March 15-31	QPA
<b>February</b>		
B. Scoppola (Università degli Studi di Roma "Tor Vergata")	Feb. 25-27	RSS
E. Scoppola (Università degli Studi "Roma Tre", I)	Feb. 15-19	RSS
E. Olivieri (Università degli Studi Roma I, I)	Feb. 15-19	RSS
A. Gaudilliere (Université de Provence, F)	Feb. 15-19	RSS
G. Weiss (University of Haifa, IL)	Feb. 16-25	QPA
K. Duffy (Hamilton Institute Dublin, IE)	Feb.15-19	QPA
F. Di Girolamo (European Comission Joint Research Center, I)	Feb. 8-10	MRM
Y. Kerner (Technion-Israel Institute of Technology, Haifa, IL)	Feb. 3-5	QPA
<b>January</b>		
D. Madan ( University of Maryland, College Park, USA)	Jan. 31-Feb.7	EUR CHAIR
M. Parlar (Mcmaster University, CA)	Jan. 21-27	QPA
B. D'Auria (Universidad Carlo III de Madrid, E)	Jan. 18-24	QPA
S. Zacks (Columbia University, Binghamton, USA)	Jan. 8-19	QPA
R. Castro (University of Binghamton, New York, USA)	Jan. 4-7	SIM
D. Perry (University of Haifa, IL)	Jan. & Febr. 5	QPA

In total .....researchers visited EURANDOM in 2010 (from several days up to ... months).  
Total residence time: 152,8 weeks.

Distribution over the programmes:

Programme	Number of visits	Weeks
MRM	4	16
QPA	21	41
RSS	12	42
SIM	3	3
Chair / general	2	4
	<b>42</b>	<b>106</b>

## EXPENDITURE

The sum of the expenditure is based on the audited financial report.

Expenditure (in K euro)

Staff	861
Senior Fellows	79
Travel	25
Visitors	55
Workshops, Seminars	82
Books, Journals, Software	12
Depreciation costs	4
General costs	<u>36</u>
TOTAL	1154

Furthermore postdocs "In Natura" (...K Euro), visitors (...K Euro) and workshop participants (...K Euro) with their own grants form an essential part of the EURANDOM activities. Based on average cost estimates this contribution "in natura" represented this year a money value of ...K Euro.