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Preface

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This issue of *Metrika* is devoted to the topics of invited lectures of the *8th German Open Conference on Probability and Statistics (GOCPS 2008)*. The conference was held at the RWTH Aachen University in March 2008. It was hosted by the Probability and Statistics Group of the Deutsche Mathematiker-Vereinigung (DMV) jointly with the RWTH Aachen University, and supported by the Bernoulli Society for Mathematical Statistics and Probability. It continued the series of conferences held in Marburg 1993, Freiberg 1996, München 1998, Hamburg 2000, Magdeburg 2002, Karlsruhe 2004, and Frankfurt 2006, each hosted by the Probability and Statistics Group of the DMV.

The Probability and Statistics Group (DMV-Fachgruppe Stochastik) with currently about 400 members is a subsection of the German Mathematical Society (DMV). The aim of this group is to promote the development and application of probability theory and statistics. This includes the organization of conferences and workshops, the support of young researchers, the contact with related disciplines and societies, and the representation of probability theory and statistics in educational and governmental matters.

In the tradition of the previous conferences hosted by the Probability and Statistics Group, the GOCPS 2008 provided an international forum for presentation and discussion of new results in the area of probability and statistics. About 500 participants attended this conference. Five plenary talks and 16 invited section talks were

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given by participants from Belgium, Canada, France, Italy, the Netherlands, Norway, Sweden, Switzerland, Ukraine, and the United States. Additionally, about 290 talks were contributed in 16 sessions by participants coming from more than 35 countries. The sessions were Stochastic Analysis; Limit Theorems and Large Deviations; Stochastic Geometry, Spatial Statistics, and Image Analysis; Random Discrete Structures and Analysis of Algorithms; Stochastic Processes: Theory and Applications; Time Series and Statistics of Stochastic Processes; Curve Estimation; Asymptotic Statistics; Stochastic Optimization and Operations Research; Data Analysis and Multivariate Statistics; Stochastic Models in Finance and Insurance; Statistical Methods in Finance and Insurance; Econometrics and Risk Analysis; Stochastic Models in the Natural Sciences; Statistics in Medicine and Biosciences; Stochastic Methods in Engineering. See also http://gocps2008.rwth-aachen.de, the homepage of GOCPS 2008.

We are grateful to the *Metrika* Editors Udo Kamps and Holger Dette for the invitation to publish selected papers from the GOCPS 2008 as a Special Issue of *Metrika*. All the papers in this volume have been refereed according to the usual high standards of *Metrika*. Sincere thanks are given to the authors and to the referees whose work has ensured the quality of this Special Issue.

This Special Issue of *Metrika* contains 14 papers from invited speakers of GOCPS 2008. The invited speakers who contributed to this issue are N. Balakrishnan, D. Banjevic, K. A. Doksum, P. Doukhan, S. N. Evans, F. Flandoli, G. Jongbloed, G. Molenberghs, T. Mountford, L. A. Pastur, E. Riccomagno, A. Schick, W. Schoutens, and A. van der Vaart. We are glad that the papers range from theoretical aspects of probability theory up to applied statistics so that they cover the whole range of the conference.

The papers of S. N. Evans, F. Flandoli, T. Mountford, L. A. Pastur, and W. Schoutens treat topics in probability theory. In the paper "Hyperdeterminantal point processes" by Steven N. Evans and Alex Gottlieb, a class of processes is investigated which generalizes determinantal processes. Determinantal processes arise naturally in different fields as random matrix theory, combinatorics and representation theory. Their correlation functions are given as the determinant of a matrix which is built up from pairwise interactions between particles. They provide a broad class of models that exhibit repulsion between particles. In their paper, the authors study an analogous class of processes, where the pairwise interactions are replaced with higher-order interactions between $2M$ particles. Consequently, the role of matrices is played by $2M$-dimensional arrays, and the determinant is replaced by a suitable generalization—Cayley's first hyperdeterminant. The authors show that some of the nice properties of determinantal processes carry over to hyperdeterminantal processes.

The paper "Remarks on uniqueness and strong solutions to deterministic and stochastic differential equations" by Franco Flandoli is a survey on the author's recent research on strong solutions of stochastic differential equations, motivated by problems arising in fluid dynamics. Research in this field aims at giving uniqueness criteria for (stochastic) partial differential equations coming from fluid dynamics. The author addresses two particular aspects: the "regularization" of SDE's with non-regular drifts with stochastic flows such that the stochastic partial differential equation has a unique strong solution, and the superposition of strong solution of SDE's.

The paper "Hölder properties of local times for fractional Brownian Motions" by Driss Baraka, Tom Mountford and Yimin Xiao investigates the local time of d-dimensional N-parameter fractional Brownian Motion, proving a law of the iterated logarithm for the local time and its supremum. The authors generalize previous results for the one-parameter case $N = 1$, using the representation of d-dimensional N-parameter fractional Brownian Motion as a stochastic integral with respect to white noise.

The paper "Central limit theorem for linear eigenvalue statistics of the Wigner and the sample covariance random matrices" by Anna Lytova and Leonid Pastur establishes a Central Limit Theorem for linear eigenvalue statistics of Wigner random matrices, under more general assumptions than known previously. First, matrices with Gaussian entries are considered, then matrices with entries of zero excess (fourth cumulant), and finally, the results are carried over to matrices with entries with non-zero excess.

The paper "Jumps in intensity models" by Jessica Cariboni and Wim Schoutens considers intensity based credit risk models where the default intensity is modeled by an Ornstein–Uhlenbeck process, which itself is driven by a Lévy process. Concrete formulas for the default probability are obtained. The model is calibrated to a series of real-market term structures, and compared to existing intensity models like the (in)homogeneous Poisson model or the Cox–Ingersoll–Ross model.

A paper between probability theory and statistics is the paper of Paul Doukhan, Nathanaël Mayo, and Lionel Truquet about "Weak dependence, models and some applications". It presents several models for weakly dependent processes and random fields and proves new asymptotic results for weakly dependent random fields. The considered processes include ARCH(∞) models for which a least squares estimation is given.

Asymptotic results for U-statistics based on quadratic influence functions are derived in the paper "Quadratic semiparametric Von Mises calculus" of James Robins, Lingling Li, Eric Tchetgen, and Aad van der Vaart. They consider in particular models with a nuisance parameter of high dimension or low regularity, where the parameter of interest cannot be estimated at $n^{-1/2}$-rate.

Asymptotic results via U-statistics are also derived in the paper "Convergence rates of density estimators for sums of powers of observations" by Anton Schick and Wolfgang Wefelmeyer. This paper uses the fact that local U-statistics can be used as empirical estimators of the density of functions of observations. The author have shown earlier that the rate of convergence decreases if the power of two added observations is equal to two. In this paper, they demonstrate that the estimator behaves similar as classical density estimators if the power is greater than 2.

The paper of Geurt Jongbloed on "Consistent likelihood-based estimation of a star-shaped distribution" concerns the estimation of star-shaped distributions. Maximum likelihood estimators are not consistent estimators for star-shaped distributions. But the paper shows that special smoothing of the likelihood yields consistent estimators.

Asymptotic results are also shown in the papers of C. M. Schafer and K. A. Doksum as well as C. Sotto, C. Beunckens, G. Molenberghs, I. Jansen, and G. Verbeke. But these papers are more motivated by concrete statistical problems.

The paper "Selecting local models in multiple regression by maximizing power" of Chad M. Schafer and Kjell A. Doksum deals with the problem of estimating the

relationship between a response variable and d covariates in a non-parametric regression setting. They present a new approach which copes with the dilemma that with high dimension d, the sparsity of data in regions of the sample space makes estimation of non-parametric curves and surfaces virtually impossible.

The paper "Marginalizing pattern-mixture models for categorical data subject to monotone missingness" of Cristina Sotto, Caroline Beunckens, Geert Molenberghs, Ivy Jansen, and Geert Verbeke treats the problem of missing observations in models for categorical data. At first it gives an overview on several types of missingness. For monotone missingness, it presents a method of estimating the missing observations from the available observations and shows how this method improves the estimators of model parameters.

The papers of N. Balakrishnan and D. Banjevic deal with reliability and life time estimation. Dragan Banjevic studies the behavior of the quotient of the variance and the mean of the remaining useful life in the paper "Remaining useful life in theory and practice". He also derives the limiting distribution of the standardized remaining useful life if this quotient is increasing.

The paper "A synthesis of exact inferential results for exponential step-stress models and associated optimal accelerated life-tests" of Narayanaswamy Balakrishnan reviews several developments on exact and approximate inferential methods for different types of accelerated life-tests. It also gives an account of several open problems.

Another review paper is the paper "A short history of algebraic statistics" of Eva Riccomagno. It contains not only the first approaches on using methods of computer algebra in statistics and experimental design but also describes recent developments and results.