



BRÅKET



*Information om seminarier och högre undervisning
i matematiska ämnen i Stockholmsområdet*

NR 37

FREDAGEN DEN 19 NOVEMBER 2004

BRÅKET

Veckobladet från
Institutionen för matematik
vid Kungl Tekniska Högskolan
och Matematiska institutionen
vid Stockholms universitet

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KTH
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Sista manustid för nästa nummer:
Torsdagen den 25 november
kl. 13.00.

SEMINARIER

Må 11–22 kl. 13.15. Seminarium i teoretisk datalogi.
Johan Glimming, Nada, KTH: *Difunctorial semantics of object calculus: Towards algebra of objects*. Rum 1537, Nada, KTH, Lindstedtsvägen 3, plan 5. Se Bråket nr 36 sidan 6.

Må 11–22 kl. 14.15–15.00. Seminarium i numerisk analys. Jesper Oppelstrup, Nada, KTH: *Title to be announced*. Rum 4523, Nada, KTH, Lindstedtsvägen 5, plan 5.

Må 11–22 kl. 18.30. Populärvetenskaplig föreläsning i fysik. Professor Henrik Cederquist, Atomfysik, SU: *Solvinden och kometer — laddade möten: Om röntgenstrålning från kosmiska snöbollar*. Oskar Kleins auditorium, Roslagstullsbacken 21, AlbaNova universitetscentrum. Se Bråket nr 36 sidan 3.

Ti 11–23 kl. 14.00–15.00. Mittag-Leffler Seminar. Dmitri Znamenski, Eurandom, Eindhoven: *Connectivity, cluster components, and distances in the power law random graph*. Institut Mittag-Leffler, Auravägen 17, Djursholm.

Fortsättning på nästa sida.

Money, jobs: Se sidorna 6–7.

SEMINARIUM I MATEMATISK STATISTIK

Bo Söderberg:

Random graph models with hidden colour

Abstract: We show how to construct more general models of random graphs by adding hidden colour to well-known models — such as the Erdős-Renyi model or random graphs with a given degree distribution. The classes of models thus obtained admit a far more general correlation structure, while allowing for the simple computation of interesting observables, of local as well as global nature.

Tid och plats: Onsdagen den 24 november kl. 15.15 i rum 306 (Cramérrummet), hus 6, Matematiska institutionen, SU, Kräftriket.

Seminarier (fortsättning)

- Ti 11–23 kl. 14.00–16.00. Seminar in Statistical Genetics and Bioinformatics.** Professor Ola Hössjer, Matematisk statistik, SU: *Multiple testing in genetics and bioinformatics*. Rum 306 (Cramérrummet), hus 6, Matematiska institutionen, SU, Kräftriket. Se Bråket nr 36 sidan 5.
- Ti 11–23 kl. 14.15. Docentföreläsning i matematik. Mattias Jonsson:** *Singularities and complex dynamics*. Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 35 sidan 4.
- Ti 11–23 kl. 15.30–16.30. Mittag-Leffler Seminar. Jeff Steif,** Chalmers tekniska högskola, Göteborg: *Exceptional times for dynamical percolation*. Institut Mittag-Leffler, Auravägen 17, Djursholm.
- On 11–24 kl. 10.15–12.00. Kombinatorikseminarium. Aiden A. Bruen,** University of Calgary: *The geometry and combinatorics of MDS codes*. Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 4.
- On 11–24 kl. 13.15. Seminarium i analys och dynamiska system. Magnus Aspenberg:** *The Collet-Eckmann condition for rational functions on the Riemann sphere*. Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 3.
- On 11–24 kl. 13.15–15.00. Algebra and Geometry Seminar. Alexander Berglund:** *Poincaré series of monomial rings*. Rum 306, hus 6, Matematiska institutionen, SU, Kräftriket. Se Bråket nr 36 sidan 6.
- On 11–24 kl. 13.15–15.00. Logikseminariet Stockholm-Uppsala. Marko Djordjevic:** *Slumpstrukturer med ändlig rang*. (Fortsättning från seminariet den 10 november.) Sal MIC 3513, Matematiska institutionen, Polacksbacken, Uppsala universitet.
- On 11–24 kl. 15.15. Seminarium i matematisk statistik. Bo Söderberg,** Lunds universitet: *Random graph models with hidden colour*. Rum 306 (Cramérrummet), hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 1.
- To 11–25 kl. 14.00–15.00. Presentation av examensarbete i fysik. Christoffer Gottlieb:** *Transient identification at nuclear power plants using support vector machines*. Rum C3:3031, avdelningen för kärn- och reaktorfysik, Roslagstullsbacken 21, AlbaNova universitetscentrum. Se sidan 5.
- To 11–25 kl. 14.00–15.00. Mittag-Leffler Seminar. Gerard Hooghiemstra,** Delft University of Technology: *Distances in random graphs with finite variance degrees*. Institut Mittag-Leffler, Auravägen 17, Djursholm.
- To 11–25 kl. 15.30–16.30. Mittag-Leffler Seminar. Volker Schmidt,** Ulm University: *Nonparametric morphological estimators in statistical image analysis*. Institut Mittag-Leffler, Auravägen 17, Djursholm.
- Må 11–29 kl. 13.15–14.15. DNA-seminariet Uppsala-KTH (Dynamics, Number theory, and Analysis). Thomas Guhr,** Matematisk fysik, LTH, Lunds universitet: *Random Matrices in physics and supersymmetric methods*. Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 6.
- Må 11–29 kl. 14.45–15.45. DNA-seminariet Uppsala-KTH (Dynamics, Number theory, and Analysis). (Observera lokalen!) Kurt Johansson,** Matematik, KTH: *Determinantal processes and number variance saturation*. Sal E36, KTH, Lindstedtsvägen 3, entréplanet. Se sidan 6.

Fortsättning på nästa sida.

Seminarier (fortsättning)

- Må 11–29 kl. 16.15–17.00. Seminarium i finansiell matematik.** (*Observera tiden!*)
Simon Oljans presenterar sitt examensarbete: *A Liability Matching Approach Involving Structured Products — An analysis of a model which could be used by a financial advisor in estimating its clients' pension liabilities*. Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 5.
- Ti 11–30 kl. 14.00–16.00. Kollokvium i filosofi.** **Fred Feldman**, University of Massachusetts: *Moore's open question argument*. Rum D255, Filosofiska institutionen, SU.
- Ti 11–30 kl. 14.00–16.00. Seminar in Statistical Genetics and Bioinformatics.**
Professor Jens Lagergren, Stockholm Bioinformatics Center, SU och KTH: *Probabilistic analysis of gene families from multiple species*. Rum 306 (Cramér-rummet), hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 4.
- On 12–01 kl. 13.00. Seminarium i statistik.** **Mathias Villani**: *Bayesiansk statistik II*. (Fortsättning från seminariet den 17 november.) Sal B705, Statistiska institutionen, SU, Universitetsvägen 10B, plan 7, Frescati.

SEMINARIUM I ANALYS OCH DYNAMISKA SYSTEM**Magnus Aspenberg:****The Collet-Eckmann condition****for rational functions on the Riemann sphere**

Abstract: In 1986 Mary Rees proved in a famous paper that the set of functions admitting an absolutely continuous invariant measure in the parameter space of rational functions of a given degree $d \geq 2$ has positive Lebesgue measure.

In the talk I will formulate a theorem, which states that the set of functions satisfying the so-called Collet-Eckmann condition has positive Lebesgue measure in the parameter space of rational functions for any fixed degree $d \geq 2$. M. Rees' theorem is a consequence of this combined with recent results of J. Graczyk, S. Smirnov and F. Przytycki.

A function is *Collet-Eckmann* if there are constants $C > 0$ and $\gamma > 0$ such that, for every critical point c whose forward orbit does not contain any other critical point, the following holds:

$$|(R^n)'(R(c))| \geq Ce^{\gamma n}, \text{ for all } n \geq 0.$$

The approach to prove the main theorem is to use a method developed earlier by M. Benedicks and L. Carleson, where they prove corresponding results for the quadratic family and families of Hénon maps.

Another consequence of the main theorem is that the Julia set is equal to the Riemann sphere for a set of positive Lebesgue measure in the space of rational functions for any fixed degree $d \geq 2$.

Tid och plats: Onsdagen den 24 november kl. 13.15 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

KOMBINATORIKSEMINARIUM

Aiden A. Bruen:

The geometry and combinatorics of MDS codes

Abstract: We discuss codes C of length n over an alphabet A of size q . Then a code word is simply a string of length n over A and C is just a collection of code words. Let d denote the minimum Hamming distance [= number of disagreements] between pairs of code words in C . Denote the number of code words in C by M . A version of “the main problem in coding theory” is as follows.

Question 1. How big can M be, given d , q and n ?

We skirmish with the combinatorics of this problem and derive the combinatorial Singleton bound. Question 1 involves many fundamental and unsolved problems going back to Euler.

We then proceed to the linear case and study question 1 in this context. Even then the general problem remains unsolved, but there has been significant progress. In particular the pioneering work of B. Segre, involving the Hasse-Weil estimates for algebraic curves, is explored. The role of rational normal curves is detailed. These are the geometric embodiment of the so-called Reed-Solomon codes, which are the main block codes used in industry.

We close with a sketch of recent results concerning possible extensions of long linear codes.

Tid och plats: Onsdagen den 24 november kl. 10.15–12.00 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

SEMINAR IN STATISTICAL GENETICS AND BIOINFORMATICS

Jens Lagergren:

Probabilistic analysis of gene families from multiple species

Abstract: Comparative genomics in general and orthology analysis in particular are becoming increasingly important parts of gene function prediction. Previously, orthology analysis and reconciliation have been performed only with respect to the parsimony model. This discards many plausible solutions and sometimes precludes finding the correct one. In many areas in bioinformatics probabilistic models have proven to be both more realistic and powerful than parsimony models. We introduce a probabilistic gene evolution model based on a birth-death process in which a gene tree evolves “inside” a species tree. Based on this model, we develop a tool with the capacity to perform practical orthology analysis, based on Fitch’s original definition, and more generally for reconciling pairs of gene and species trees with respect to duplications and losses. We develop a Bayesian analysis based on MCMC which facilitates approximation of the posterior distribution for reconciliations. This also gives a way to estimate the probability that a pair of genes are orthologs. The algorithm performs very well on synthetic as well as biological data. Using standard correspondences, our results carry over to allele trees as well as biogeography. When also lateral transfers are considered, reconciliation is much harder. We give a combinatorial model and parsimony algorithms for gene duplications and lateral gene transfers. These algorithms detect lateral gene transfers with very low error rates.

Tid och plats: Tisdagen den 30 november kl. 14.00–16.00 i rum 306 (Cramérrummet), hus 6, Matematiska institutionen, SU, Kräftriket.

PRESENTATION AV EXAMENSARBETE I FYSIK

Christoffer Gottlieb:

Transient identification at nuclear power plants using support vector machines

Abstract: In this thesis, Support Vector Machines (SVM's), a relatively new paradigm in learning machines, are studied for their potential to recognize transient behaviour of sensor signals corresponding to various accident events at Nuclear Power Plants (NPP's). Transient classification is a major task for any computer-aided system for recognition of various malfunctions. The ability to identify the state of operation or events occurring at an NPP is crucial so that personnel can select adequate and swift response actions. Modular Accident Analysis Program (MAAP4) is a software program that can be used to model various normal and abnormal events at an NPP. A previous study used MAAP4 to simulate various accident events (pipe ruptures) at boiling water reactors (BWR). In the main experiment of this thesis, the simulated sensor readings corresponding to these events have been used to train and test SVM classifiers. SVM calculations have demonstrated that they can produce classifiers with good generalization ability for our specific formulation of the learning problem. This in turn indicates that SVM's show promise as classifiers for the learning problem of identifying transients. A significant portion of the effort spent in this thesis went into examining SVM's and the underlying theory, Statistical Learning Theory (SLT).

Tid och plats: Torsdagen den 25 november kl. 14.00 – 15.00 i rum C3:3031, avdelningen för kärn- och reaktorfysik, Roslagstullsbacken 21, AlbaNova universitetscentrum.

SEMINARIUM I FINANSIELL MATEMATIK

Simon Oljans

presenterar sitt examensarbete:

A Liability Matching Approach Involving Structured Products — An analysis of a model which could be used by a financial advisor in estimating its clients' pension liabilities

Abstract: This master thesis studies the difficulties that a financial advisor at an intermediate sized investment bank can face when trying to find a feasible asset allocation for an institutional client with pension liabilities. The problem is that for a financial advisor in such a division it is difficult to make a quick and accurate estimation of the client's total liability side, especially since there is often a lack of pension fund information due to confidentiality. In the thesis we thus define a framework of a very pragmatic model, or approach, which can be used to obtain an approximate estimation of the institutional client's liability side and based on this then, suggests an asset allocation involving a bond portfolio, a portfolio of risk-bearing instruments, and a portfolio consisting of structured products. Based on previous research conducted in the area of portfolio optimization involving liabilities, an alternative and more comprehensive approach is also developed. The results of this alternative approach are compared with the results of the first suggested approach and a discussion on which, if either one, of the approaches an intermediate investment bank should use concludes the thesis.

Tid och plats: Måndagen den 29 november kl. 16.15 – 17.00 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

**DNA-SEMINARIET UPPSALA-KTH
(DYNAMICS, NUMBER THEORY, AND ANALYSIS)**

Thomas Guhr:

Random Matrices in physics and supersymmetric methods

Abstract: Random Matrices are powerful tools in many different areas of modern physics, ranging from nuclei, atoms and molecules over chaotic and disordered mesoscopic systems to quantum chromodynamics (theory of the strong interaction). By presenting a few examples, the usefulness of Random Matrices is explained.

Moreover, it is shown why supersymmetric methods are nowadays so important in Random Matrix Theory. There is a natural extension of harmonic analysis on symmetric ordinary spaces to symmetric superspaces, connecting to the work of Harish-Chandra and Gelfand. Some group-theoretical aspects are discussed. Finally, it is demonstrated that the supersymmetric approach also yields a natural extension of Calogero-Sutherland models for interacting particles.

Tid och plats: Måndagen den 29 november kl. 13.15–14.15 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

**DNA-SEMINARIET UPPSALA-KTH
(DYNAMICS, NUMBER THEORY, AND ANALYSIS)**

Kurt Johansson:

Determinantal processes and number variance saturation

Abstract: I will discuss the construction of determinantal point processes on the real line, which have the interesting feature that they show number variance saturation. This means that the variance of the number of particles in an interval converges to a limiting value as the length of the interval goes to infinity. Number variance saturation is also seen for example in the zeros of the Riemann zeta-function and in quantum chaos, but these only serve as a motivation and I will not present any new results for these. The construction is based on non-intersecting Brownian paths.

Tid och plats: Måndagen den 29 november kl. 14.45–15.45 i sal E36, KTH, Lindstedtsvägen 3, entréplanet.

MONEY, JOBS

Columnist: Hans Rullgård, Department of Mathematics, SU. E-mail: hansr@math.su.se.

Info = information. This will be given and repeated until obsolete. Rely on other sources as well.

BBKTH = Bulletin Board at the Department of Mathematics, KTH.

BBSU = Bulletin Board at the Department of Mathematics, SU.

The following information, with links, is also available at <http://www.math.su.se/~hansr/mj.html>.

Unless stated otherwise, a given date is the last date (e.g. for applications), and the year is 2004. A number without an explanation is a telephone number.

Standard information channels

1. A channel to information from Vetenskapsrådet: <http://www.vr.se/naturteknik/index.asp>.
2. A channel to information from the European Mathematical Society: <http://www.emis.de>.
3. A channel to information from the American Mathematical Society: <http://www.ams.org>.
4. KTH site for information on funds: <http://www.kth.se/aktuellt/stipendier>.
5. Stockholm University site for information on funds: <http://www.su.se/forskning/stipendier/databas.php3>.

(Continued on the next page.)

6. Umeå site for information on funds: http://www.umu.se/umu/aktuellt/stipendier_fond_anslag.html.
7. Job announcement site: <http://www.maths.lth.se/nordic/Euro-Math-Job.html>. This is run by the European Mathematical Society.
8. Stiftelsen för internationalisering av högre utbildning och forskning (STINT) site for information on funds: <http://www.stint.se>.
9. Nordisk Forskerutdanningsakademi (NorFA) site for information on funds: <http://www.norfa.no>.
10. Svenska institutet (SI) site for information on funds: <http://www.si.se>.

New information

Jobs, to apply for

11. Institutionen för matematik vid KTH utlyser ett antal anställningar som doktorand, alternativt utbildningsbidrag, 19 november. Info: Kurt Johansson, 08-790 61 82, e-post kurtj@math.kth.se, Ari Laptev, 08-790 62 44, e-post laptev@math.kth.se. Web-info: <http://www.math.kth.se/utlysning.tjanst/utlysning041027.html>.
12. Institutionen för matematik vid KTH söker ett antal vikarierande lektorer under vårterminen 2005. Sista ansökningsdag 28 november. Info: Mats Boij, e-post boij@math.kth.se. Web-info: <http://www.math.kth.se/utlysning.tjanst/vik.lektor.html>.

Old information

Money, to apply for

13. Fulbright Grants for Visiting Lecturers and Research Scholars kan sökas för forskning och undervisning i USA 2005/06. Info: 08-534 818 85. Web-info: <http://www.usemb.se/Fulbright/> och http://www.usemb.se/Fulbright/grants2005_6.pdf.
14. Karl Engvers Stiftelse har till ändamål att främja vetenskaplig forskning vid KTH genom att i första hand dela ut medel till forskare och lärare vid högskolans institutioner att användas till resor och deltagande i konferenser samt för presentationer av egna forskningsresultat. I andra hand får stiftelsens medel användas till andra projekt som drivs av studenter eller forskarstuderande vid högskolan. Ansökan skickas eller lämnas till KTHs registratorskontor och skall ha kommit in senast den 22 november. Web-info och ansökningsblankett: se punkt 4 ovan.
15. Institut Mittag-Leffler utlyser stipendier för verksamhetsåret 2005/06. Sista ansökningsdag är 31 januari 2005. Info och anmälningsblankett, som kan kopieras, finns på Matematiska institutionens anslagstavla, SU.
16. Från Knut och Alice Wallenbergs Stiftelse ställs anslag till rektors för KTH förfogande för att "i första hand användas till bidrag för sådana resor, som bäst befordrar ett personligt vetenskapligt utbyte till gagn för svensk forskning. Bidrag skall främst beviljas till yngre forskare. Medel kan även — efter rektors bedömning — undantagsvis disponeras för utländska gästforskare." Bidrag kan sökas under hela året. Info: Anette Nyström, 08-790 70 59. Web-info: se punkt 4 ovan.

Jobs, to apply for

17. The Faculty of Exact and Natural Sciences at Universidad de Antioquia, Colombia, opens a public competition of merits, national and international, in order to hire five (5) full time tenure track faculty (open rank) with PhD degree, in the following areas: (i) Algebra or Theory of Numbers, (ii) Numeric Analysis or Optimization, (iii) Mathematical Analysis or Functional Analysis, (iv) Logic or Theory of Groups, and (v) Differential Equations. Info: luisfer@matematicas.udea.edu.co, heragis@matematicas.udea.edu.co. Web-info (in Spanish): <http://www.udea.edu.co/consulta/publico>.