# BRÅKET

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

**NR 39** **FREDAGEN DEN 3 DECEMBER 2004**



**BRÅKET**

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

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*Sista manustid för nästa nummer:*
Torsdagen den 9 december kl. 13.00.


## Disputation i matematisk statistik

*Fredrik Armerin* disputerar på avhandlingen *Aspects of Cash Flow Valuation* fredagen den 10 december kl. 10.00 i sal E1, KTH, Lindstedtsvägen 3, b.v. Se Bråket nr 38 sidan 3.


**Money, jobs:** Se sidorna 7 – 8.


## SEMINARIER

**Fr 12 – 03 kl. 15.00. Licentiatseminarium i matematik. Joakim Arnlind** presenterar sin licentiatavhandling: *Eigenvalue Dynamics and Membrane Solutions.* Opponent: **Professor Martin Bordemann.** Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 38 sidan 5.

**Ti 12 – 07 kl. 10.15. Mathematical Physics Seminar. Professor Evgeny Akhmedov,** ICTP Trieste: *Neutrino tomography of the Earth.* Seminarierummet, Roslagstullsbacken 11, AlbaNova universitetscentrum.

**Ti 12 – 07 kl. 14.00 – 16.00. Seminar in Statistical Genetics and Bioinformatics. Dr Patrik Rydén,** Institutionen för klinisk mikrobiologi, Umeå universitet: *Microarray data analysis: A statistical challenge or a nightmare.* Rum 306 (Cramérrummet), hus 6, Matematiska institutionen, SU, Kräftriket. Se Bråket nr 38 sidan 6.


**Fortsättning på nästa sida.**


## Lucia-konferens i Algebraisk Geometri

Denna äger rum vid KTH den 13 – 14 december 2004. Se sidan 6.

## Disputation i matematik/tillämpad matematik

*Paul Lankinen* disputerar vid Mälardalens högskola på avhandlingen *Spinors, Clifford algebras and superenergy tensors* fredagen den 17 december kl. 10.15. Se sidan 5.

## Nästa nummer av Bråket,

som utkommer den 10 december, blir det sista före juluppehållet. Numret därefter utkommer den 14 januari 2005.

**Seminarier (fortsättning)**

**On 12–08 kl. 10.15 – 12.00. Kombinatorikseminarium.** *(Observera lokalen!)* **Federico Incitti:** *A way of "drawing" the Bruhat order in the symmetric group, with applications to the combinatorial invariance conjecture.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 4.

**On 12–08 kl. 13.00. Seminarium i statistik:** *Eleverna från sannolikhetsteorikursen presenterar Buffons nålproblem.* Sal B705, Statistiska institutionen, SU, Universitetsvägen 10B, plan 7, Frescati.

**On 12–08 kl. 13.15. Seminarium i analys och dynamiska system. Anders Olofsson:** *Wandering subspace theorems.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 5.

**On 12–08 kl. 13.15 – 15.00. Algebraseminarium. Annette Werner,** Universität Stuttgart: *Vector bundles on p-adic curves and parallel transport.* Rum 306, hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 3.

**On 12–08 kl. 14.15. Logikseminariet Stockholm-Uppsala.** *(Observera tiden!)* **Erik Palmgren:** *Constructing quotient spaces using restricted power sets.* Sal MIC 3513, Matematiska institutionen, Polacksbacken, Uppsala universitet. Se sidan 6.

**On 12–08 kl. 15.15. Seminarium i matematisk statistik. Andreas Nordvall Lagerås,** SU: *Brownsk rörelse med stokastisk klocka given av träfftider för en subordinator.* Rum 306 (Cramérrummet), hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 3.

**To 12–09 kl. 13.15. Mathematical Physics Seminar. Professor Evgeny Akhmedov,** ICTP Trieste: *Three-flavour effects in neutrino oscillations.* Seminarierummet, Roslagstullsbacken 11, AlbaNova universitetscentrum.

**To 12–09 kl. 14.00 – 15.00. Mittag-Leffler Seminar. Patrick Thiran,** École Polytechnique Fédérale de Lausanne: *Percolation models for wireless networks with interferences.* Institut Mittag-Leffler, Auravägen 17, Djursholm.

**Fr 12–10 kl. 15.15. Licentiatseminarium i matematik. Sonja Čukić** presenterar sin licentiatavhandling: *Topological Properties of Complexes of Graph Homomorphisms.* Opponent: **Professor Rade Živaljević.** Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 6.

**Må 12–13 kl. 15.15 – 17.00. Seminarium i matematisk statistik. Filip Lindskog:** *Functional large deviations for multivariate regularly varying random walks.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 5.

**Ti 12–14 kl. 14.00 – 16.00. Seminar in Statistical Genetics and Bioinformatics. Ph. D. Mark Iles,** Institutionen för medicinsk epidemiologi och biostatistik, Karolinska Institutet: *Marker selection for genetic association studies.* Rum 306 (Cramérrummet), hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 7.

**On 12–15 kl. 13.00. Seminarium i statistik. Mathias Villani:** *Bayesiansk statistik III.* (Fortsättning från seminariet den 1 december.) Sal B705, Statistiska institutionen, SU, Universitetsvägen 10B, plan 7, Frescati.

**On 12–15 kl. 14.15 – 15.00. Seminarium i numerisk analys.** *(Observera dagen!)* **Professor Smadar Karni,** University of Michigan, USA: *Title to be announced.* Rum 4523, Nada, KTH, Lindstedtsvägen 5, plan 5.

**Fortsättning på nästa sida.**

**Seminarier (fortsättning)**

**To 12–16 kl. 14.00 – 16.00. Kollokvium i filosofi. Jesse Prinz,** University of North Carolina, Chapel Hill, USA: *The perceptual basis of concepts.* Rum D255, Filosofiska institutionen, SU.

**To 12–16 kl. 14.15 – 15.00. Seminarium i numerisk analys.** *(Observera dagen!)* **Anders Logg,** Toyota Technological Institute, Chicago: *A compiler for variational forms.* Rum 4523, Nada, KTH, Lindstedtsvägen 5, plan 5. Se sidan 4.

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## ALGEBRASEMINARIUM

**Annette Werner:**
**Vector bundles on $p$-adic curves and parallel transport**

*Abstract:* On a compact Riemann surface every finite-dimensional complex representation of the fundamental group gives rise to a flat vector bundle. By a theorem of Weil, one obtains precisely the holomorphic bundles whose indecomposable components have degree zero. It was proved by Narasimhan and Seshadri that unitary representations give rise to semistable bundles of degree zero. Moreover, every stable bundle of degree zero comes from an irreducible unitary representation.

This talk will deal with a partial $p$-adic analogue of this theory established in joint work with Christopher Deninger. We define a category of vector bundles on a $p$-adic curve to which we associate representations of the algebraic fundamental group, and more generally of the fundamental groupoid. This amounts to the definition of isomorphisms of parallel transport along etale paths in the curve.

If the curve has a smooth model, all bundles with strongly semistable reduction are contained in our category. Here a semistable bundle in characteristic $p$ is called strongly semistable if it remains semistable after pullbacks under powers of Frobenius. Hence for vector bundles with strongly semistable reductions there exist isomorphisms of parallel transport along etale paths.

*Tid och plats:* Onsdagen den 8 december kl. 13.15 – 15.00 i rum 306, hus 6, Matematiska institutionen, SU, Kräftriket.

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## SEMINARIUM I MATEMATISK STATISTIK

**Andreas Nordvall Lagerås:**
**Brownsk rörelse med stokastisk klocka**
**given av träfftider för en subordinator**

*Sammanfattning:* När en Brownsk rörelse är en alltför enkel modell kan man införa en stokastisk klocka för att få en process med andra egenskaper. Jag har undersökt vad som händer med en invers subordinator som klocka. Givet en subordinator kan denna process konstrueras genom att man vid tiden $t$ låter den ha ett värde som är första passagetiden till nivå $t$ för subordinatorn. Inversa subordinatorer har många egenskaper som liknar förnyelseprocessers. Genom en koppling av förnyelseteorin till teorin för Coxprocesser kan man få fram uttryck för moment av godtycklig ordning.

*Tid och plats:* Onsdagen den 8 december kl. 15.15 i rum 306 (Cramérrummet), hus 6, Matematiska institutionen, SU, Kräftriket.

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## KOMBINATORIKSEMINARIUM

**Federico Incitti:**
**A way of "drawing" the Bruhat order in the symmetric group, with applications to the combinatorial invariance conjecture**

*Abstract:* The well-known combinatorial invariance conjecture states that, given a Coxeter group $W$, ordered by Bruhat order, and given two elements $x, y$ in $W$, with $x < y$, the Kazhdan-Lusztig polynomial, or equivalently the $R$-polynomial, associated with $(x, y)$ supposedly depends only on the poset structure of the interval $[x, y]$. This is known to be generally true for intervals up to rank 4.

In this talk we introduce a new pictorial way for describing the Bruhat order in the symmetric group, namely the diagram of a pair of permutations. We show how the diagram of $(x, y)$ allows us to obtain information about the poset structure of $[x, y]$, and about the $R$-polynomial associated with $(x, y)$. This way of "drawing" the Bruhat order seems to be a useful tool in relation to the combinatorial invariance conjecture. In particular we show how it makes it possible to prove that the conjecture is true for intervals of the symmetric group of rank 5.

*Tid och plats:* Onsdagen den 8 december kl. 10.15 – 12.00 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

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## SEMINARIUM I NUMERISK ANALYS

**Anders Logg:**
**A compiler for variational forms**

*Abstract:* The finite element method provides a general framework for the solution of differential equations and can be viewed as a machine that automates the discretization of differential equations. Given the variational formulation $a(u, v) = L(v)$ of a differential equation $A(u) = f$, the finite element method generates a discrete system of equations for the approximate solution $U$.

This generality of the finite element method is seldom reflected in codes, which are often specialized and can handle only one equation or a small set of differential equations.

Today, a number of tools exist that (partly) automate the implementation of finite element methods, but people still tend to write their own specialized codes, thinking this will give them better performance than with a general code in which the overhead of generality may be substantial.

This problem can be solved by using a compiler approach. The FEniCS Form Compiler FFC takes as input a variational formulation $a(u, v) = L(v)$ and automatically generates code (C, C++, Fortran, ...) for the evaluation of the variational form (assembly). This approach allows for maximum generality (any form, any element) and the generated code can be as efficient as hand-written code.

FFC is a key component of FEniCS, a free software project for the Automation of Computational Mathematical Modelling. I will also give a general introduction to the FEniCS project and discuss how FFC relates to other components of FEniCS, in particular DOLFIN, FIAT, and FErari.

*Tid och plats:* Torsdagen den 16 december kl. 14.15 – 15.00 i rum 4523, Nada, KTH, Lindstedtsvägen 5, plan 5.

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## SEMINARIUM I ANALYS OCH DYNAMISKA SYSTEM

**Anders Olofsson:**
**Wandering subspace theorems**

*Abstract:* Let $\mathcal{H}$ be a Hilbert space and $T \in \mathcal{L}(\mathcal{H})$ a bounded linear operator on $\mathcal{H}$ which is bounded from below. We consider the approximation relation

$$\mathcal{H} = [\mathcal{E}]_T = \bigvee_{k=0}^{\infty} T^k(\mathcal{E}), \quad \text{where } \mathcal{E} = \mathcal{H} \ominus T(\mathcal{H}),$$

as well as some stronger statements phrased in terms of summability of the (formal) series

$$x \sim \sum_{k \geq 0} T^k P L^k x \quad (x \in \mathcal{H}).$$

Here $L = (T^*T)^{-1}T^*$ is the left inverse of $T$ with $\ker L = \ker T^* = \mathcal{E}$ and $P = I - TL$ is the orthogonal projection of $\mathcal{H}$ onto $\mathcal{E}$. The principal new result is an estimate of Fourier multiplier type for this series. The results obtained include strengthened forms of previous results by A. Aleman, S. Richter, S. M. Shimorin and C. Sundberg.

*Tid och plats:* Onsdagen den 8 december kl. 13.15 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

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## SEMINARIUM I MATEMATISK STATISTIK

**Filip Lindskog:**
**Functional large deviations**
**for multivariate regularly varying random walks**

*Abstract:* We extend classical results by A. V. Nagaev (1969) on large deviations for sums of iid regularly varying random variables to partial sum processes of iid regularly varying vectors. The results are stated in terms of a heavy-tailed large deviation principle on the space of cadlag functions. We illustrate how these results can be applied to functionals of the partial sum process, including ruin probabilities for multivariate random walks and long strange segments. These results make precise the idea of heavy-tailed large deviation heuristics: in an asymptotic sense only the largest step contributes to the extremal behaviour of a multivariate random walk.

This is joint work with Henrik Hult, Thomas Mikosch and Gennady Samorodnitsky.

*Tid och plats:* Måndagen den 13 december kl. 15.15 – 17.00 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

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## DISPUTATION I MATEMATIK/TILLÄMPAD MATEMATIK

**Paul Lankinen**

disputerar på avhandlingen

**Spinors, Clifford algebras and superenergy tensors**

fredagen den 17 december kl. 10.15 i sal Gamma, hus U, Mälardalens högskola, Högskoleplan, Västerås. Till fakultetsopponent har utsetts *professor James Vickers,* School of Mathematics, University of Southampton.

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## LOGIKSEMINARIET STOCKHOLM-UPPSALA

**Erik Palmgren:**
**Constructing quotient spaces using restricted power sets**

*Abstract:* We present some problems concerning the existence of quotient spaces in various constructive approaches to topology. A predicative solution of the existence problem for neighbourhood spaces is given. A different solution was found, independently, by Hajime Ishihara.

*Tid och plats:* Onsdagen den 8 december kl. 14.15 i sal MIC 3513, Matematiska institutionen, Polacksbacken, Uppsala universitet.

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## LICENTIATSEMINARIUM I MATEMATIK

**Sonja Čukić**

presenterar sin licentiatavhandling:

**Topological Properties of Complexes of Graph Homomorphisms**

*Opponent:* **Professor Rade Živaljević**

*Abstract:* Complexes of graph homomorphisms, or `Hom` complexes, are one instance of complexes associated to graphs in order to find obstacles for colouring of graphs. Namely, in a topological approach to graph colouring problems, which was initiated by Lovász, we assign a cell complex to a graph and by studying its algebraic and topological invariants, we obtain a lower bound for the chromatic number of the given graph.

I will present results about topological properties of two special classes of `Hom` complexes which were studied in this thesis. The main results obtained are:

**Theorem.** Let $G$ be a graph of maximal valency $d$, then the complex $\texttt{Hom}(G, K_n)$ is $k$-connected, whenever $n \geq d + k + 2$.

**Theorem.** Each connected component of $\texttt{Hom}(C_m, C_n)$, where $C_k$ is a cyclic graph with $k$ vertices, is either homeomorphic to a point or homotopy equivalent to $S^1$.

*Tid och plats:* Fredagen den 10 december kl. 15.15 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

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**Lucia-konferens i Algebraisk Geometri**

Måndagen den 13 och tisdagen den 14 december 2004 kommer vi att organisera en liten konferens i Algebraisk Geometri, finansierad med hjälp av ett anslag från Göran-Gustafsson-Stiftelsen. Några icke-lokala deltagare är D. Eriksson (Paris), A. L. Knutsen (Oslo), K. Ranestad (Oslo), D. Rydh (Göteborg) och P. Salberger (Göteborg).

Programmet är för närvarande nästan helt öppet; mer information kommer i nästa nummer av Bråket. Om du är intresserad av att tala eller delta i konferensen eller om du vill ha mer information, var vänlig och kontakta en av oss.

Välkomna!

Carel Faber
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## SEMINAR IN STATISTICAL GENETICS AND BIOINFORMATICS

### Mark Iles:
### Marker selection for genetic association studies

*Abstract:* As the cost of genotyping drops and the number of known SNP markers increases, the number and density of SNP's being genotyped for a single study is increasing. Analysing such a large number of variables simultaneously presents a statistical challenge. However, given the high levels of correlation between closely spaced SNP's, there is potentially much redundancy in genotyping large numbers of SNP's. It is clear that if this correlation structure were well understood/modelled, much of the redundancy could be avoided by genotyping only the most informative SNP's. This has given rise to the identification of haplotype tagging SNP's. These htSNP's are the markers that capture most of the variation in the region being studied, with as little redundancy as possible. I will discuss the ways in which htSNP's are identified, how well they perform on reality and how their performance might be better estimated.

*Tid och plats:* Tisdagen den 14 december kl. 14.00 – 16.00 i rum 306 (Cramérrummet), hus 6, Matematiska institutionen, SU, Kräftriket.

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## 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.
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 teknik, fysik och matematik vid Mitthögskolan, Sundsvall, ledigförklarar två vikariat som universitetslektor i matematik, 10 december. Info: Klas Forsman, 060-14 87 42, Olof Björkqvist, 070-591 37 15. Web-info: http://www.mh.se/MHTemplates/MHPage____16388.aspx.

(Continued on the next page.)

**Old information**

*Money, to apply for*

12. 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.

13. 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.

14. 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*

15. 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.