BRÅKET

Information om seminarier och högre undervisning i matematiska ämnen i Stockholmsområdet

NR 40 **FREDAGEN DEN 12 DECEMBER 2003**

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 8 januari kl. 13.00.

SEMINARIER

Fr 12–12 kl. 13.30. Nobelföreläsning i fysik. Professor Alexei A. Abrikosov, Argonne National Laboratory, USA: *Theory of high-Tc superconducting cuprates.* KTH-Electrums aula, Isafjordsgatan 22, Kista.

Fr 12–12 kl. 14.45. Nobelföreläsning i fysik. Professor Vitaly L. Ginzburg, P. N. Lebedev Physics Institute, Moscow, Russia: *What problems in physics and astrophysics seem now to be especially interesting and important in the XXI century?* KTH-Electrums aula, Isafjordsgatan 22, Kista.

Må 12–15 kl. 10.15. Presentation av magisteravhandling. Sara Nordström: *Sömnadens geometri.* Sal 2215, Matematiska institutionen, Polacksbacken, Uppsala universitet.

Fortsättning på nästa sida.

Minisymposium on Categorical Logic

Detta äger rum vid Uppsala universitet onsdagen den 17 december. Se sidan 3.

Disputation i matematisk statistik

Maria Deijfen disputerar på avhandlingen *Stochastic models for spatial growth and competition* fredagen den 19 december kl. 13.15 i sal 14, hus 5, Matematiska institutionen, SU, Kräftriket. Se Bråket nr 38 sidan 6.

Kurs

Anders Karlsson: Valda problem i dynamiska system och ergodteori. Se sidan 4.

God Jul och Gott Nytt År

önskas Bråkets läsare. Nästa nummer av Bråket utkommer fredagen den 9 januari 2004.

Högre undervisning

Ett schema för högre kurser och seminarier i matematik vid KTH och Stockholms universitet under vårterminen 2004 finns på sidorna 7 – 8.

Seminarier (fortsättning)

Må 12–15 kl. 13.15 – 14.15. Seminar in Analysis and its Applications. Alexander Ulanovskii: *On sign changes and positivity of functions having spectral gap at the origin.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 39 sidan 5.

Må 12–15 kl. 14.15. Seminarium i teoretisk datalogi. Rafael Pass: *Bounded-concurrent secure two-party computation in a constant number of rounds (joint work with Alon Rosen).* Rum 1537, Nada, KTH, Lindstedtsvägen 3, plan 5. Se sidorna 5 – 6.

Må 12–15 kl. 16.15 – 17.00. Seminarium i finansiell matematik. *(Observera tiden!)* **Kim Hansson** presenterar sitt examensarbete: *Fixed Income Attribution Analysis.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 5.

Ti 12–16 kl. 10.15. Plurikomplexa seminariet. Björn Gustafsson: *From the exponential transform to hyponormal operators.* Rum 306, hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 6.

Ti 12–16 kl. 11.00 – 12.00. Docentföreläsning i matematik. Dmitry Kozlov: *Ämnen i topologisk kombinatorik.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 38 sidan 5.

Ti 12–16 kl. 13.15. Plurikomplexa seminariet. Niklas Lindholm: *Sampling for entire functions and entropy.* Rum 306, hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 3.

On 12–17 kl. 10.00. Minisymposium on Categorical Logic. Anders Kock, Aarhus: *The topos logic of "internal".* Sal 2215, Matematiska institutionen, Polacksbacken, Uppsala universitet. Se sidan 3.

On 12–17 kl. 11.15. Minisymposium on Categorical Logic. Carsten Butz, IT University of Copenhagen: *Saturated models for intuitionistic theories.* Sal 2215, Matematiska institutionen, Polacksbacken, Uppsala universitet. Se sidan 3.

On 12–17 kl. 13.15 – 14.15. Seminarium i analys och dynamiska system. Vadim Kaloshin, California Institute of Technology, USA: *How often does a surface diffeomorphism have infinitely many sinks?* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 4.

On 12–17 kl. 14.00. Minisymposium on Categorical Logic. Steve Awodey, Carnegie Mellon University: *Categories of classes.* Sal 2215, Matematiska institutionen, Polacksbacken, Uppsala universitet. Se sidan 3.

To 12–18 kl. 10.00 – 11.00. Presentation av examensarbete i matematik. Magnus Hellgren: *Modular vector invariants over fields of characteristic 2.* Sal 16, hus 5, Matematiska institutionen, SU, Kräftriket. Se sidan 6.

To 12–18 kl. 14.15 – 15.00. Seminarium i numerisk analys. Zhaojun Bai, University of California, Davis, USA: *SOAR: A Second-Order ARnoldi method for solving the quadratic eigenvalue problem.* Rum 4523, Nada, KTH, Lindstedtsvägen 3, plan 5. Se Bråket nr 39 sidan 5.

PLURIKOMPLEXA SEMINARIET

Niklas Lindholm:
Sampling for entire functions and entropy

Abstract: We will discuss the problem of sampling for entire functions and relations with N-width and entropy, as defined by Kolmogorov. For the latter, one wants to approximate functions on compact domains. The best approximators are functions that are well "concentrated" on the compact, and they are also the functions which are most difficult for the problems of sampling. To find the dimensions of these functions, one can estimate the Bergman kernel in the space. We might also discuss how this is related to "local dimension" of a vector space.

Tid och plats: Tisdagen den 16 december kl. 13.15 i rum 306, hus 6, Matematiska institutionen, SU, Kräftriket.

MINISYMPOSIUM ON CATEGORICAL LOGIC

Symposiet äger rum onsdagen den 17 december i sal 2215, Matematiska institutionen, Polacksbacken, Uppsala universitet.

Programme

10.00 **Anders Kock,** Aarhus: *The topos logic of "internal".*
Abstract: In non-standard analysis, higher order notions only admit transfer to the extent that they are modified so as to apply to internal entities. We provide an elementary topos that captures this modified logic.

11.15 **Carsten Butz,** IT University of Copenhagen: *Saturated models for intuitionistic theories.*
Abstract: Call a model of a first-order theory saturated if an arbitrary family of first-order formulae is realized (satisfied) by some element of the model precisely when every finite subset of formulae is realized. The notion of saturation is one of the back-bones of modern model theory.

In this talk we show how saturated models can be constructed using the language of categorical logic. Our main result exhibits, for each (intuitionistic) first-order theory, a topos which contains such a saturated model. As applications we will discuss the thus constructed model of Heyting arithmetic (HA), which was first investigated by Moerdijk, and a conservativity result for classical first-order logic: Infinitary logic, which is first-order logic extended by disjunctions and conjunctions over arbitrary sets of formulae, together with rules stating complete distributivity and that existential quantification distributes over filtered conjunctions, the syntactic analogous of the saturation property, is conservative over finitary first-order logic. The last-mentioned result has potential applications to a development of non-standard analysis without using the machinery of model theory.

The talk will focus on an overview of the results and their meaning.

14.00 **Steve Awodey,** Carnegie Mellon University: *Categories of classes.*
Abstract: This talk reports on recent joint work with C. Butz, A. Simpson, and T. Streicher on using categorical logic to construct natural models of various elementary set theories.

SEMINARIUM I ANALYS OCH DYNAMISKA SYSTEM

Vadim Kaloshin: How often does a surface diffeomorphism have infinitely many sinks?

Abstract: Consider the space of C^r diffeomorphisms (smooth invertible selfmaps) of a compact surface M (e.g. S^2 or T^2) $\mathrm{Diff}^r(M)$ with $r \geq 2$. A sink of $f : M \to M$ is a periodic point $x \in M$ which attracts all points from its neighbourhood (as in your kitchen). Points attracted to x are called basin of attraction of x. In the 1960's Thom conjectured that a generic diffeomorphism cannot have infinitely many coexisting sinks. Indeed, each sink has an open basin of attraction, and infinitely many of those seems too much. In the 1970's Newhouse constructed an open set of diffeomorphisms $N \subset \mathrm{Diff}^r(M)$ such that the generic diffeomorphism in N does have infinitely many coexisting sinks. It is an amazing phenomenon, called Newhouse phenomenon. It disproves Thom's conjecture and is a significant obstacle to describe ergodic properties of surface diffeomorphisms. We shall discuss this phenomenon and closely related results of Benedicks-Carleson, Mora-Viana, Wang-Young, Morreira-Yoccoz. The main result indicates in some sense that this phenomenon has "probability zero". This is a particular case of the so-called Palis conjecture.

This is a joint work with Anton Gorodetsky.

Tid och plats: Onsdagen den 17 december kl. 13.15 – 14.15 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

DOKTORANDKURS I MATEMATIK

Anders Karlsson: Valda problem i dynamiska system och ergodteori

This course will illustrate how the notions and ideas in the theory of dynamical systems can be useful to other branches of mathematics such as number theory and combinatorics. It is in a sense a sequel to the course taught by Benedicks and Johansson this fall. It will however be possible to follow the present course without any previous knowledge (apart from measure theory).

The results we will prove (following Furstenberg and others) include the theorems of van der Waerden and Szemeredi on arithmetic progressions, which belong to the intersection of combinatorics and number theory, as well as, Weyl's equidistribution theorem and Khintchin's theorem in diophantine approximation.

To motivate those studying dynamical systems we quote Sinai: "In many modern studies of dynamical systems, a big role is played by the properties of real numbers expanded into continued fractions". And to inspire those interested in numbers and combinatorics we present a challenge following Erdös:

If you have a set $B = \{n_1, n_2, \ldots\} \subset \mathbb{Z}$ *such that*

$$\sum_k \frac{1}{n_k} = \infty,$$

for example $B = \{\text{all primes}\}$*, then is it true that* B *contains arbitrarily long arithmetic progressions?*

Tid och plats: Kursen startar torsdagen den 22 januari kl. 10 – 12 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Kursen ges under läsperiod 3, d.v.s. under halva vårterminen 2004.

SEMINARIUM I FINANSIELL MATEMATIK

Kim Hansson

presenterar sitt examensarbete:

Fixed Income Attribution Analysis

Abstract: The performance of a portfolio is often measured relative to some comparison index, or benchmark. The purpose of attribution analysis is to determine how much the difference in exposure to certain risk factors has contributed to the difference in return.

In this study, a distinction is made between performance attribution analysis and return attribution analysis. Performance attribution attributes the excess return over a benchmark to differences in asset allocation and security selection. Return attribution analysis is concerned with the return of individual securities. The return of a bond is broken down with respect to such factors as accretion, coupon return and yield curve movement. The return due to a specific factor can then be aggregated to market or market sector level for the portfolio and the benchmark.

The standard framework for performance attribution and a return attribution model for bonds are presented. The model has been implemented and tested on data from the Swedish government bond market.

Tid och plats: Måndagen den 15 december kl. 16.15 – 17.00 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

SEMINARIUM I TEORETISK DATALOGI

Rafael Pass:
Bounded-concurrent secure two-party computation
in a constant number of rounds
(joint work with Alon Rosen)

Abstract: The original setting in which secure two-party protocols were investigated allowed the execution of a single instance of the protocol at a time. A more realistic setting, however, is one which allows the concurrent execution of protocols. In the concurrent setting, many two-party protocols are executed at the same time, involving many parties which may be talking with the same (or many) other parties simultaneously. This setting presents the new risk of a coordinated attack in which an adversary controls many parties, interleaving the executions of the protocols and choosing messages based on other partial executions of the protocol.

In this work we consider the problem of constructing a general protocol for secure two-party computation in a way that preserves security under concurrent composition. In our treatment, we focus on the case where an a priori bound on the number of concurrent sessions is specified before the protocol is constructed (a.k.a. bounded concurrency). We make no set-up assumptions.

Lindell (STOC 2003) has shown that any protocol for bounded-concurrent secure two-party computation, whose security is established via black-box simulation, must have round complexity that is strictly larger than the bound on the number of concurrent sessions. In this talk I will show how to construct a (non-black-box) protocol for realizing bounded-concurrent secure two-party computation in a constant number of rounds. The only previously known protocol for realizing the above task required more rounds than the pre-specified bound on the number of sessions (despite usage of non-black-box simulation techniques).

(Continued on the next page.)

An extended abstract is available from the author's homepage http://www.nada.kth.se/~rafael/.

Tid och plats: Måndagen den 15 december kl. 14.15 i rum 1537, Nada, KTH, Lindstedtsvägen 3, plan 5.

PLURIKOMPLEXA SEMINARIET

Björn Gustafsson:
From the exponential transform to hyponormal operators

Abstract: An operator T on a Hilbert space is called hyponormal if its self-commutator $[T, T^*] = TT^* - T^*T$ is a positive operator. Thirty years ago R. W. Carey and J. D. Pincus found that if $[T, T^*]$ moreover has rank one, then T can be characterized up to unitary equivalence by a function $0 \leq \rho \leq 1$, called the principal function and related to T by

$$\det\big[(T-w)^{*-1}(T-z)(T-w)^*(T-z)^{-1}\big] = \exp\left[-\frac{1}{\pi}\int \frac{\rho(\zeta)\,dA(\zeta)}{(\zeta-z)(\overline{\zeta}-\overline{w})}\right] \tag{1}$$

for large $z, w \in \mathbf{C}$. Here the right member is called the exponential transform of ρ.

In the talk I shall indicate a route in the opposite direction: given ρ of the form $\rho = \chi_\Omega$ for some domain $\Omega \subset \mathbf{C}$ one builds a Hilbert space of (equivalence classes of) functions in Ω and a hyponormal operator T on it so that (1) holds.

The talk is based on joint work with Mihai Putinar.

Tid och plats: Tisdagen den 16 december kl. 10.15 i rum 306, hus 6, Matematiska institutionen, SU, Kräftriket.

PRESENTATION AV EXAMENSARBETE I MATEMATIK

Magnus Hellgren:
Modular vector invariants over fields of characteristic 2

Abstract: Let V be a vector space over a field F and let G be a group that acts as a group of automorphisms of the symmetric algebra of V. Recall that the symmetric algebra of V is isomorphic to a polynomial algebra over K. The problem of the theory of invariants is to understand the structure of the subalgebra of polynomials, left fixed by the action of G. In this master thesis we will study the modular theory of invariants. That is, where the characteristic of the field divides the order of the group. We will consider the case $G = Zp$ and where the field K is of characteristic p. In the first section we review the most important results on these rings of invariants. These results consider generating sets, Hilbert series, degree bounds, and homological properties. In the second section we will more explicitly study some rings of invariants. We will prove a result that gives some humble but new insight into how a certain family of rings of invariants is generated, and we also provide a new proof of an old result.

Tid och plats: Torsdagen den 18 december kl. 10.00 – 11.00 i sal 16, hus 5, Matematiska institutionen, SU, Kräftriket.

Schema för högre kurser och seminarier i matematik
vid KTH och Stockholms universitet under vårterminen 2004

Fördjupningskurser

Fourieranalys, 5B1466, MA416, 5 p.
Lärare: Hedenmalm.
Tid och plats: Torsdagar kl. 10.15 – 12.00 i KTH:3721. Preliminär kursstart den 12 februari.

Representationsteori, MA419, 5 p.
Lärare: Merkulov.
Tid och plats: Tisdagar kl. 15.15 – 17.00 i SU:306. Kursstart den 27 januari.

Funktionalanalys, 5B1472, MA422, 5 p.
Lärare: Hedenmalm.
Tid och plats: Tisdagar kl. 10.15 – 12.00 i KTH:3721. Preliminär kursstart den 10 februari.

Talteori, MA430, 5 p.
Lärare: Fröberg.
Tid och plats: Måndagar kl. 15.15 – 17.00 i SU:306. Kursstart den 26 januari.

Seminariekurs IV: Gruppanalys, 5B1479.
Lärare: Kolsrud.
Tid och plats: Tisdagar kl. 15.15 – 17.00 i KTH:3733. Kursstart den 20 januari.

Doktorandkurser

Icke-kommutativ algebra.
Lärare: Björk.
Tid och plats: Torsdagar kl. 15.15 – 17.00 i SU:306.

Liealgebror.
Lärare: Löfwall.
Tid och plats: Torsdagar kl. 15.15 – 17.00 i SU:306.

Elliptiska kurvor.
Lärare: Ekedahl.
Tid och plats: Fredagar kl. 10.15 – 12.00 i SU:306.

Valda problem i algebra, 5B5201.
Lärare: Laksov (preliminärt).
Tid och plats: Meddelas senare.

Sannolikhetsteori, 5B5182.
Lärare: Holst.
Tid och plats: Torsdagar kl. 13.15 – 15.00 i KTH:3733. Kursstart den 15 januari.

Hinderproblem i matematisk fysik och industri. (Läskurs.)
Lärare: Shahgholian.
Tid och plats: Meddelas senare.

Valda problem i dynamiska system och ergodteori.
Lärare: Karlsson.
Tid och plats: Torsdagar kl. 10.15 – 12.00 i KTH:3733. Kursstart den 22 januari. Se sidan 4.

(Fortsättning på nästa sida.)

Seminarier

Algebra- och geometriseminarier.
Seminarieledare: Ekedahl, Fröberg, Roos.
Tid och plats: Onsdagar kl. 13.15 – 15.00. Varannan vecka i SU:306. Varannan vecka i KTH:3733.

Seminarier i analys och dynamiska system.
Seminarieledare: Benedicks, Boman, Carleson, Laptev, Smirnov.
Tid och plats: Onsdagar kl. 13.15 – 14.15 i KTH:3721.

Logikseminarier.
Seminarieledare: Martin-Löf, Stoltenberg-Hansen.
Tid och plats: Onsdagar kl. 10.00 – 11.45 i SU:16. Vissa veckor i Uppsala.

Plurikomplexa seminariet.
Seminarieledare: Filipsson, Jöricke, Kiselman, Passare.
Tid och plats: Varannan tisdag kl. 10.15 – 15.00. Var fjärde vecka i SU:306. Var fjärde vecka i Uppsala.

Kombinatorikseminarier.
Seminarieledare: Björner, Kozlov.
Tid och plats: Onsdagar kl. 10.15 – 12.00 i KTH:3733.

Matematik med didaktisk inriktning.
Seminarieledare: Bøgvad, Fröberg, Gottlieb, Löfwall.
Tid och plats: Vissa onsdagar kl. 10.15 – 12.00 i SU:306.

Doktorandseminarier.
Seminarieledare: Meddelas senare.
Tid och plats: Onsdagar kl. 15.30 – 16.45 i SU:16 (veckor med jämna nummer) och vid KTH (veckor med udda nummer).

Stockholms matematiska kollokvium.
Seminarieledare: K. Johansson, B. Shapiro.
Tid och plats: Vissa onsdagar kl. 16.00 – 17.00. Plats anges vid varje tillfälle.

Om du undrar över någon kurs som ej ges under läsåret, kan du kontakta huvudläraren (fördjupningskurser), din handledare eller studierektor för forskarutbildningen. Eventuellt kan någon form av studiecirkel anordnas om tillräckligt intresse finns.

För kurserna vid Stockholms universitet gäller: Undervisningen börjar tidigast under vecka 4 (19 – 23 januari). Möjlighet till tentamen på fördjupningskurser, som inte går under terminen, ges i augusti om tentamensanmälan inlämnas senast den 1 juli 2004.

Adresser:
KTH:3721: Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.
KTH:3733: Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.
SU:16: Sal 16, hus 5, Matematiska institutionen, SU, Kräftriket.
SU:306: Rum 306, hus 6, Matematiska institutionen, SU, Kräftriket.