BRÅKET

Information om seminarier och högre undervisning i matematiska ämnen i Stockholmsområdet

NR 6 **FREDAGEN DEN 9 FEBRUARI 2001**

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 15 februari
kl. 13.00.

Disputation i optimeringslära och systemteori

Camilla Landén disputerar på avhandlingen *On the term structure of forwards, futures and interest rates* fredagen den 16 februari kl. 10.00 i Kollegiesalen, Administrationsbyggnaden, KTH, Valhallavägen 79. Se Bråket nr 4 sidan 6.

SEMINARIER

Fr 02–09 kl. 9.00–10.00. Kollokvium i fysik. Dr Valdas Pasiskevicius, Optik, KTH: *Optical frequency conversion on the femtosecond time scale.* Sal F 01, Fysiska institutionen, KTH, Lindstedtsvägen 24, b.v. Se Bråket nr 5 sidan 6.

Fr 02–09 kl. 11.00–12.00. Optimization and Systems Theory Seminar. Camilla Landén, Optimeringslära och systemteori, KTH: *An introduction to arbitrage theory with the focus on problems related to the term structure of forwards, futures and interest rates.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 5 sidan 6.

Fr 02–09 kl. 14.00–15.00. Presentation av examensarbete i matematik. David Jacquet: *Algebraiska ekvationer och hypergeometriska funktioner.* Rum 16, hus 5, Matematiska institutionen, SU, Kräftriket, Roslagsvägen 101.

Må 02–12 kl. 13.15–15.00. Geometry Seminar. Professor Anthony Geramita, Kingston/Genova: *Higher secant varieties of Segre varieties.* Rum 306, hus 6, Matematiska institutionen, SU, Kräftriket, Roslagsvägen 101. Se sidan 4.

Ti 02–13 kl. 14.00–15.00. Mittag-Leffler Seminar. Sara Negri, Helsingfors: *Structural proof analysis in elementary mathematical theories.* Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 4.

On 02–14 kl. 10.15. Licentiatseminarium i teoretisk fysik. Blanka Magyari-Köpe: *First principles calculations of perouskites structural properties.* Granskare vid seminariet: **Docent Magnus Andersson,** Fysiska institutionen, KTH. Seminarierummet, Teoretisk fysik, KTH, Osquldas väg 6, plan 4.

Fortsättning på nästa sida.

Seminarier (fortsättning)

On 02–14 kl. 13.00. Seminarium i statistik. Gösta Hägglund, Statistiska institutionen, SU: *Rapport från Symposium om strukturekvationsmodeller i Chicago, 12 – 15 december 2000.* Rum B705, Statistiska institutionen, SU.

On 02–14 kl. 13.15 – 15.00. Seminarium i analys och dynamiska system. Mikael Passare, SU: *Amoebas, Monge-Ampère measures, and triangulations of the Newton polytope.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 5.

On 02–14 kl. 14.00 – 15.00. Mittag-Leffler Seminar. Thierry Coquand, Göteborg: *A solution to Borel's measure problem.* Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 6.

On 02–14 kl. 15.15. Seminarium i matematisk statistik. Professor Anders Lindquist, Optimeringslära och systemteori, KTH: *Synthetic speech and modern mathematics: What is the connection?* Rum 306, Cramérrummet, hus 6, Matematiska institutionen, SU, Kräftriket, Roslagsvägen 101. Se sidan 6.

On 02–14 kl. 15.30 – 16.30. Mittag-Leffler Seminar. Michael Rathjen, Leeds: *Variations on ordinal analysis.* Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 5.

On 02–14 kl. 16.00 – 17.00. Stockholms matematiska kollokvium. Professor Anthony Geramita, Kingston/Genova: *The rank of a matrix.* Sal 14, hus 5, Matematiska institutionen, SU, Kräftriket, Roslagsvägen 101. Se sidan 5.

To 02–15 kl. 10.00 – 11.00. Presentation av examensarbete i matematik. Jan Duracz: *Kompakthet och urvalsaxiomet.* Rum 16, hus 5, Matematiska institutionen, SU, Kräftriket, Roslagsvägen 101.

To 02–15 kl. 10.15. Seminar in Mathematical Physics. Professor Sylvie Paycha, Université Blaise Pascal, Clermont-Ferrand: *Determinants of Dirac type operators and anomalies in quantum field theory.* Seminarierummet, Teoretisk fysik, KTH, Osquldas väg 6, plan 4. Se sidan 7.

Fr 02–16 kl. 9.00 – 10.00. Kollokvium i fysik. Professor Waclaw Gudowski, Kärn- och reaktorfysik, KTH: *Accelerator-driven transmutation of waste — principles and possible impact on acceptance of nuclear power.* Sal F01, Fysiska institutionen, KTH, Lindstedtsvägen 24, b.v.

Fr 02–16 kl. 15.15. Matematiska institutionens kollokvium (Uppsala). Professor Jan-Olov Strömberg, KTH: *Wavelets with applications.* Rum 2247, Matematiska institutionen, Polacksbacken, Uppsala universitet. Institutionen bjuder på kaffe, te och kakor kl. 14.45 i personalrummet. Se sidan 3.

Ti 02–20 kl. 13.15 – 14.15. Seminarium i PDE och spektralteori. Dr Shao-Ming Fei, Bonn University: *An introduction to quantum information and computing.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 3.

On 02–21 kl. 13.00. Seminarium i statistik. Olivier Guilbaud, AstraZeneca, Södertälje: *Exact comparisons of means and within-subject variances in* 2×2 *crossover trials.* Rum B705, Statistiska institutionen, SU.

Fortsättning på nästa sida.

Seminarier (fortsättning)

On 02–21 kl. 13.15–15.00. Seminarium i analys och dynamiska system. Yehuda Pinchover, Technion — Israel Institute of Technology: *Liouville theorems and integral representations for periodic elliptic equations.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 7.

On 02–21 kl. 15.15–16.00. Seminarium i matematik och fysik vid Mälardalens högskola (Västerås). Yelena Strigun, Mälardalens högskola: *About 16th Hilbert problem.* Lektionssal N16, Mälardalens högskola, Västerås. Internet-adressen till information om seminariet är http://www.ima.mdh.se/seminarier/index.e.shtml.

On 02–21 kl. 15.15–17.00. KTH Learning Lab inbjuder till seminarium. Professor Mats Hanson, KTH Learning Lab: *KTH Learning Lab — Call for participation!* Sal D2, KTH, Lindstedtsvägen 5, b.v. Se sidan 6. *Observera att förhandsanmälan krävs.*

To 02–22 kl. 15.00–17.00. KTH Learning Lab inbjuder till seminarium. Rektor Anders Fransson: *Redovisning av slutrapport: Pedagogisk förnyelse i högskolan.* Sal E1, KTH, Lindstedtsvägen 3, b.v. Se sidan 7. *Observera att förhandsanmälan krävs.*

To 02–22 kl. 15.15–16.00. Seminarium i matematik och fysik vid Mälardalens högskola (Eskilstuna). Lars Alexandersson, Linköpings universitet: *En ny förberedande kurs i matematik för nybörjare — Upplägg, innehåll och erfarenheter.* Lektionssal B315, Mälardalens högskola, Eskilstuna. Internet-adressen till information om seminariet är http://www.ima.mdh.se/seminarier/index.e.shtml.

MATEMATISKA INSTITUTIONENS KOLLOKVIUM (UPPSALA)

Jan-Olov Strömberg: Wavelets with applications

Abstract: The Wavelet theory has developed during the last two decades out of Harmonic analysis and Signal analysis. It has led to many applications in signal processing and numerical analysis.

I will sketch some of the basic principles in the theory of wavelets and show some examples of applications of wavelet methods in image and sound processing.

Tid och plats: Fredagen den 16 februari kl. 15.15 i rum 2247, Matematiska institutionen, Polacksbacken, Uppsala universitet. Institutionen bjuder på kaffe, te och kakor kl. 14.45 i personalrummet.

SEMINARIUM I PDE OCH SPEKTRALTEORI

Shao-Ming Fei:
An introduction to quantum information and computing

Abstract: We present some basic physical concepts and mathematical problems in quantum information and computing theory. Quantum bits (qubits), measurement, entanglement, gates, no-cloning theorem, etc., are explained in a view of mathematics. With detailed simple examples, quantum cryptography, cloning, teleportation, computation (quantum parallelism, algorithm), error correction, measure of entanglement are introduced.

Tid och plats: Tisdagen den 20 februari kl. 13.15–14.15 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

GEOMETRY SEMINAR

Anthony Geramita: Higher secant varieties of Segre varieties

Abstract: This is about joint work in progress with M. V. Catalisano (Genova) and A. Gimigliano (Bologna).

The Segre varieties I will consider in this talk are the usual embeddings of $\mathbb{P}^{n_1} \times \cdots \times \mathbb{P}^{n_r}$ into $\mathbb{P}^N$ $(N = \prod_{i=1}^{r}(n_i + 1) - 1)$ given by $\mathcal{O}_{\mathbb{P}^{n_1}}(1) \times \cdots \times \mathcal{O}_{\mathbb{P}^{n_r}}(1)$. If $\mathbb{X}$ is any non-degenerate variety in $\mathbb{P}^N$, then a *secant-*$\mathbb{P}^{s-1}$ *to* $\mathbb{X}$ is a $\mathbb{P}^{s-1} \subset \mathbb{P}^N$ which is spanned by s distinct points of $\mathbb{X}$. The variety $\mathbb{X}^{s-1}$, which is the closure of the union of all secant-$\mathbb{P}^{s-1}$'s to $\mathbb{X}$, is called the $(s-1)$*-secant variety of* $\mathbb{X}$.

The problem I will discuss in this talk is the following: What is the dimension of $\mathbb{X}^{s-1}$? and, more particularly, when is this dimension the *expected* dimension, i.e.

$$\min\{s \dim \mathbb{X} + (s-1),\, N\}\,?$$

The answers to these questions are well-known for $r = 2$ but very little is known when $r > 2$. I will explain an approach to this problem using *apolarity* (an approach first intimated by Macaulay and recently brought into sharp focus by the work of A. Iarrobino and V. Kanev). We convert the problem to one about Hilbert functions of "fat" points in products of projective spaces (essentially a modern re-interpretation of a classical theorem of Terracini) and solve this problem in a number of cases.

One particularly interesting collection of cases in which we can give a complete solution to the problem involves the use of combinatorics. I will explain a connection between the question concerning the dimension of secant varieties of Segre varieties and, on the one hand, rook coverings of multi-dimensional chessboards (which is, in turn, related to the study of perfect graphs) and on the other hand a problem about monomial ideals in multigraded polynomial rings. This last collection of examples builds on recent results of R. Ehrenborg.

Tid och plats: Måndagen den 12 februari kl. 13.15 – 15.00 i rum 306, hus 6, Matematiska institutionen, SU, Kräftriket, Roslagsvägen 101.

MITTAG-LEFFLER SEMINAR

Sara Negri: Structural proof analysis in elementary mathematical theories

Abstract: Previous work (BSL, December 1998) gave a way of extending sequent calculi with cut-free rules representing mathematical axioms. These rules act on the antecedent parts of sequents. I will first present a dual form of such rules, acting on the succedent parts of sequents. The duality is illustrated by the left rules for apartness and the right rules for equality.

These systems of rules, although cut- and contraction-free, need not in general ensure terminating proof search. In many of the theories considered, however, a "subterm property", a weaker form of the subformula property, holds: Among all derivations of a sequent there will be one which contains only terms from the conclusion. Such a property will give a method of bounded proof search.

Last I will present applications of these methods to lattice theory.

Tid och plats: Tisdagen den 13 februari kl. 14.00 – 15.00 i Institut Mittag-Leffler, Auravägen 17, Djursholm.

SEMINARIUM I ANALYS OCH DYNAMISKA SYSTEM

Mikael Passare: Amoebas, Monge-Ampère measures, and triangulations of the Newton polytope

Abstract: The amoeba of a holomorphic function f is by definition the image in $\mathbb{R}^n$ of its zero locus under the simple mapping $(z_1, \ldots, z_n) \mapsto (\log|z_1|, \ldots, \log|z_n|)$. The terminology was introduced in the nineties by the famous (biologist and) mathematician Israel Gelfand and his co-authors. In this talk we shall discuss a natural convex potential function N_f, with the property that its Monge-Ampère mass is concentrated to the amoeba. We obtain results of two kinds; by approximating N_f with a piece-wise linear function we get striking combinatorial information regarding the amoeba and the Newton polytope of f; by computing the Monge-Ampère measure we find sharp bounds for the area of amoebas in $\mathbb{R}^2$. All this is joint work with Hans Rullgård.

Tid och plats: Onsdagen den 14 februari kl. 13.15 – 15.00 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

MITTAG-LEFFLER SEMINAR

Michael Rathjen: Variations on ordinal analysis

Abstract: The plan is to present some ideas leading from an ordinal analysis of PA à la Schütte to an ordinal analysis of Π^1_2 comprehension.

Further, it is planned that this talk will be followed by more informal talks dealing with technical details of the ordinal analysis of Π^1_2-CA.

Tid och plats: Onsdagen den 14 februari kl. 15.30 – 16.30 i Institut Mittag-Leffler, Auravägen 17, Djursholm.

STOCKHOLMS MATEMATISKA KOLLOKVIUM

Anthony Geramita: The rank of a matrix

Abstract: The notion of the rank of a matrix is one that is fundamental in linear algebra and known to all beginning mathematics students. In this talk I should like to take another look at this notion and recast it in several different ways. I shall do this in an attempt to come up with an analogous notion for multi-dimensional arrays.

In the process we shall take a look at putting products of projective spaces inside a projective space (the Segre embeddings) and the various kinds of secants to these embeddings. This will eventually allow me to describe (briefly) the (unsolved) "rook-covering" problem for multi-dimensional chess boards and its connection to the problem under discussion.

Tid och plats: Onsdagen den 14 februari kl. 16.00 – 17.00 i sal 14, hus 5, Matematiska institutionen, SU, Kräftriket, Roslagsvägen 101.

Till skillnad från de traditionella seminarierna är kollokviet avsett för en bred publik. Meningen är att föreläsningarna skall vara begripliga exempelvis för intresserade doktorander i matematik och samtidigt hålla en hög vetenskaplig klass. Det kan vara föredrag av översiktskaraktär eller belysande djuplodningar med tonvikten på idéerna mer än formaliteterna. Vår strävan är att anlita erkänt skickliga föredragshållare, och föreläsningstiden är sextio minuter.

MITTAG-LEFFLER SEMINAR

Thierry Coquand:
A solution to Borel's measure problem

Abstract: Borel's original definition of the measure of a Borel set (1898) was by transfinite induction on the building of this set. This definition by induction raises however a coherence problem: It has to be shown that the measure depends only on the set, and not on the way it is built as a Borel set. This coherence problem was solved indirectly by Lebesgue, by using the notion of exterior measure.

It is natural to ask for a more direct proof of coherence, and this question appears as "Borel's measure problem" in Lusin's book on analytical sets. We study this problem for the usual measure on Cantor space, using the point-free definition of Borel sets introduced by Per Martin-Löf ("Notes on Constructive Mathematics"). We show then how to define the measure of such Borel sets as "hyperarithmetical reals", i.e. reals built from rationals by repeated (may be transfinitely) sups and infs of bounded sequences.

This construction is done in an intuitionistic framework using as primitive the notion of generalized inductive definition. It is convenient to present this work as part of a constructive development of the theory of Riesz spaces and Dedekind sigma-complete Riesz spaces. This work can then be used as a possible approach to constructive probability theory.

Tid och plats: Onsdagen den 14 februari kl. 14.00 – 15.00 i Institut Mittag-Leffler, Auravägen 17, Djursholm.

SEMINARIUM I MATEMATISK STATISTIK

Anders Lindquist:
Synthetic speech and modern mathematics:
What is the connection?

Abstract: In this talk we show how important problems in signal processing and spectral estimation lead to mathematical problems in such diverse areas as classical function theory, geometry, topology, optimization, and global analysis.

Tid och plats: Onsdagen den 14 februari kl. 15.15 i rum 306, Cramérrummet, hus 6, Matematiska institutionen, SU, Kräftriket, Roslagsvägen 101.

KTH LEARNING LAB INBJUDER TILL SEMINARIUM

Mats Hanson:
KTH Learning Lab — Call for participation!

KTH Learning Lab arbetar med utveckling av utbildningen tillsammans med alla KTHs lärare och studenter. Hur går det till? Hur kan du som lärare aktivt deltaga? Vi presenterar också Wallenberg Global Learning Network och Swedish Learning Lab och de utvecklingsprojekt som vi samverkar i.

Anmälan om deltagande i seminariet skall göras till Helge Strömdahl, helge@lib.kth.se, senast måndagen den 19 februari.

Tid och plats: Onsdagen den 21 februari kl. 15.15 – 17.00 i sal D2, KTH, Lindstedtsvägen 5, b.v.

SEMINAR IN MATHEMATICAL PHYSICS

Sylvie Paycha: Determinants of Dirac type operators and anomalies in quantum field theory

Abstract: Anomalies in quantum field — such as (abelian and non-abelian) chiral anomalies — can be interpreted as logarithmic variations of determinants of Dirac type operators. We give a precise derivation of such anomalies using ζ-determinants of admissible elliptic operators, a class which includes small deformations of Dirac type operators. When seen as a logarithmic variation of a ζ-determinant, the non-abelian chiral anomaly satisfies the Wess-Zumino consistency relations in a trivial way.

We relate this ζ-function approach to the Fujikawa approach based on heat-kernel methods showing how these two approaches coincide when — as in the case of chiral anomalies — some algebraic obstructions expressed in terms of Wodzicki residues vanish.

Tid och plats: Torsdagen den 15 februari kl. 10.15 i seminarierummet, Teoretisk fysik, KTH, Osquldas väg 6, plan 4.

SEMINARIUM I ANALYS OCH DYNAMISKA SYSTEM

Yehuda Pinchover: Liouville theorems and integral representations for periodic elliptic equations

Abstract: This is a joint work with Peter Kuchment.

The first part of the talk will be devoted to Liouville theorems which describe for a given PDE the structure and dimension of the space of solutions of a given polynomial growth. The results previously proven for second order periodic elliptic equations in divergence form by M. Avellaneda and F.-H. Lin, and J. Moser and M. Struwe are significantly extended.

In the second part of the talk we will discuss integral representations for certain classes of exponentially growing solutions of second order periodic elliptic equations. These representations are the analogues of those previously obtained by S. Agmon, S. Helgason, and other authors for solutions of the Helmholtz equation.

Tid och plats: Onsdagen den 21 februari kl. 13.15 – 15.00 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

KTH LEARNING LAB INBJUDER TILL SEMINARIUM

Anders Fransson: Redovisning av slutrapport: Pedagogisk förnyelse i högskolan

Rektor Anders Fransson, som på Regeringens uppdrag utreder *Pedagogisk förnyelse i högskolan* redovisar sin slutrapport till Utbildningsdepartementet som överlämnas den 21 februari. Angående utredningsuppdraget, se http://utbildning.regeringen.se/kommitteer/direktiv/pdf/2000_24.pdf.

Anmälan om deltagande i seminariet skall göras till Helge Strömdahl, helge@lib.kth.se, senast tisdagen den 20 februari.

Tid och plats: Torsdagen den 22 februari kl. 15.00 – 17.00 i sal E1, KTH, Lindstedtsvägen 3, b.v.
