BRÅKET

Information om seminarier och högre undervisning i matematiska ämnen i Stockholmsområdet

NR 38 **FREDAGEN DEN 20 NOVEMBER 2009**

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 26 november kl. 13.00.

Constructive Mathematics: Proof and Computation

Föreläsningar och seminarier i detta ämne skall ges vid Uppsala universitet den 24 november. Se Bråket nr 37 sidan 5.

PDE afternoon

Denna skall äga rum vid KTH tisdagen den 24 november. Se Bråket nr 37 sidan 8.

SEMINARIER

Må 11–23 kl. 11.00. Minicourse in mathematics. Kelly Jabbusch: *Positivity in Algebraic Geometry. Second lecture.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 37 sidan 4.

Må 11–23 kl. 11.15–12.15. DNA-seminariet Uppsala-KTH (Dynamical systems, Number theory, Analysis). Jimi Truelsen, Cambridge: *Mass equidistribution of Eisenstein series on* GL(2). Sal Å11167, Ångströmlaboratoriet, Uppsala universitet. Se sidan 4.

Må 11–23 kl. 15.15–17.00. Seminarium i matematisk statistik. Professor emeritus Lars Holst: *Några rekordproblem.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 37 sidan 7.

Ti 11–24 kl. 13.00–13.50. PDE Seminar. Maria Gualdani, University of Texas, Austin: *Global existence of a free boundary problem with non-standard sources.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 37 sidan 8.

Ti 11–24 kl. 14.00–14.50. PDE Seminar. Richard Tsai, University of Texas, Austin: *Adaptive and greedy algorithms for inverse point source discovery in complicated domains.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 37 sidan 8.

Fortsättning på nästa sida.

Workshop on Perfect codes and related topics

Denna skall äga rum vid KTH den 4 – 5 december. Se sidan 3.

Postdoctoral fellowships in mathematics

utlyses av Institutionen för matematik vid KTH. Se sidan 4.

Seminarier (fortsättning)

Ti 11–24 kl. 18.00. Populärvetenskaplig föreläsning i fysik. Kambiz Fathi, Astrofysik, SU: *Supermassiva svarta hål i universum: Om så kallade monster i centrum av galaxer.* Oskar Kleins auditorium, Roslagstullsbacken 21, AlbaNova universitetscentrum. Se Bråket nr 37 sidan 6.

On 11–25 kl. 10.00–11.00. Presentation av examensarbete i matematik (15 högskolepoäng, grundnivå). **Simon Wikander:** *Turings maskin, beräkningsbarhet och avgörbarhetsproblemet.* Handledare: **Rikard Bøgvad.** Sal 21, hus 5, Matematiska institutionen, SU, Kräftriket. Se sidan 5.

On 11–25 kl. 10.15–11.15. Kombinatorikseminarium. Anders Björner, KTH: *A simplicial complex in number theory.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 6.

On 11–25 kl. 13.15–14.15. Seminarium i analys och dynamiska system. Niel Dobbs, KTH: *A random walk in exponential dynamics.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 37 sidan 9.

On 11–25 kl. 13.15–14.15. Algebra and Geometry Seminar. Roy Skjelnes, KTH: *Quotients by equivalence relations of schemes.* Rum 306, hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 7.

On 11–25 kl. 14.00–15.00. Institut Mittag-Leffler Seminar. Jean Larson, Gainesville, Florida: *Scatter thoughts on infinite combinatorics.* Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 3.

On 11–25 kl. 15.15. Seminarium i matematisk statistik. Dmitrii Silvestrov, SU: *Optimal Stopping and Convergence for American Type Options.* Rum 306 (Cramérrummet), hus 6, Matematiska institutionen, SU, Kräftriket. Se Bråket nr 37 sidan 7.

On 11–25 kl. 15.30–16.30. Institut Mittag-Leffler Seminar. Hajime Ishihara, Japan Advanced Institute of Science and Technology: *A boundedness principle in constructive reverse mathematics.* Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 7.

Fr 11–27 kl. 13.15–14.15. Graduate Student Seminar. Kathrin Vorwerk: *What is: "Combinatorial fixed point theorems"?* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 5.

Må 11–30 kl. 11.00. Minicourse in mathematics. Kelly Jabbusch: *Positivity in Algebraic Geometry. Third lecture.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 37 sidan 4.

Må 11–30 kl. 15.15. Seminarium i matematisk statistik. Daniel Alai, ETH: *Prediction Uncertainty in Stochastic Claims Reserving Methods.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 6.

On 12–02 kl. 10.15. Kombinatorikseminarium. Hanna Uscka-Wehlou, Uppsala: *Some combinatorial problems related to digital straight lines with irrational slopes and to balanced aperiodic words.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 8.

On 12–02 kl. 13.15–14.15. Seminarium i analys och dynamiska system. Anders Öberg, Uppsala: *Title to be announced.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

Fortsättning på nästa sida.

Seminarier (fortsättning)

On 12–02 kl. 13.15. Algebra and Geometry Seminar. Runar Ile, Bergen: *Title to be announced.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

On 12–02 kl. 16.00. KTH/SU Mathematics Colloquium. Professor Laurent Bartholdi, Georg-August-Universität Göttingen: *Insanely twisted rabbits.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Kaffe/te serveras kl. 15.30 i pausrummet, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 4. Se sidan 5.

To 12–03 kl. 10.15. Seminarium i teoretisk datalogi. Peter Jonsson, Luleå: *Introduction to supercompilation.* Rum 1537, KTH CSC, Lindstedtsvägen 3, plan 5. Se sidan 8.

To 12–03 kl. 10.30. Seminar in Fluid Mechanics. Peter Davidson, University of Cambridge: *Structure formation in rotating turbulence.* Seminarierummet, Institutionen för mekanik, KTH, Teknikringen 8. Se sidan 6.

INSTITUT MITTAG-LEFFLER SEMINAR

Jean Larson:
Scatter thoughts on infinite combinatorics

Abstract: Two themes in the history of infinite combinatorics in the twentieth century will be explored: the partition calculus and order, especially trees. The partition calculus begins with early results like Ramsey's theorem on the existence of infinite homogeneous sets for finite partitions of the r-element subsets of an infinite set. The talk will detail some of the extensions of this result into the uncountable, as well as looking at a variety of examples that delineate the limits to what can be achieved. The study of order begins with Hausdorff's investigations into generating sets, bases and types universal for various collections of order types. Add the Suslin problem which was translated by Kurepa into a question about trees to get a rich collection of questions which have been studied with increasingly sophisticated techniques over the twentieth century.

Tid och plats: Onsdagen den 25 november kl. 14.00 – 15.00 vid Institut Mittag-Leffler, Auravägen 17, Djursholm.

WORKSHOP ON PERFECT CODES AND RELATED TOPICS

There will be a workshop with the title given above at the Department of Mathematics, KTH.

Date and place: Seminar room 3721, Department of Mathematics, KTH, Lindstedtsvägen 25, floor 7, from Friday, December 4, at 10.00 to Saturday, December 5, at 17.40.

The workshop will consist of 16 talks. For more information, see the next issue of Bråket, or http://www.math.kth.se/~olohed/perfectcodes09.html, where a schedule of the talks will be presented at latest on Saturday, November 21.

Everyone is welcome to attend!
Olof Heden and Faina I. Solov'eva

DNA-SEMINARIET UPPSALA-KTH (DYNAMICAL SYSTEMS, NUMBER THEORY, ANALYSIS)

Jimi Truelsen:

Mass equidistribution of Eisenstein series on GL(2)

Abstract: We consider the Eisenstein series $E(g, s, \chi)$ on $\mathrm{GL}(2, A)$, where A is the adele ring of a number field. We prove (quantitatively) that the measure $|E(g, 1/2 + it, \chi)|^2 d\mu$ becomes equidistributed in the limit $t \to \infty$. Here $d\mu$ is the measure derived from the Haar measure on $\mathrm{GL}(2, A)$. This generalizes previous results due to W. Luo and P. Sarnak and S. Koyama.

The work is joint with C. M. Sorensen.

Tid och plats: Måndagen den 23 november kl. 11.15 – 12.15 i sal Å11167, Ångströmlaboratoriet, Uppsala universitet.

THE DEPARTMENT OF MATHEMATICS, KTH, INVITES APPLICATIONS FOR POSTDOCTORAL FELLOWSHIPS IN MATHEMATICS

The postdoctoral fellowships are financed by a grant from the K. & A. Wallenberg Foundation.

A candidate is expected to conduct research in one of the following areas: Algebraic geometry, Dynamical systems, Combinatorics, Complex analysis, Mathematical physics and Spectral theory, Number theory, or Partial differential equations.

The duration of the stay is 12 months, with a possibility of prolongation for an additional 12 months, beginning during June – August or September 1, 2010, at the latest.

An application should contain a Curriculum Vitae (maximum 3 pages) and a list of publications, a description of research (maximum 3 pages) and two or three letters of recommendation, sent by the recommenders, not the applicant. It is recommended that the candidate contacts one of the persons mentioned below before submitting the application.

Candidates cannot have their Ph.D. degrees from KTH or the Stockholm area. Candidates must not have obtained their Ph.D. degrees earlier than January 1, 2007. Those who have not finished their Ph.D. studies when applying must obtain their Ph.D. degrees before June 1, 2010.

The last date for applications is Friday, January 8, 2010. Applications received after this date may not receive full consideration. The candidates should give the full address at which they can be reached during January – May 2010. Please indicate the reference number S-2009-0873 in the application.

Applications and letters of recommendation should be sent to: Institutionen för matematik, att. Leena Druck, Kungliga Tekniska högskolan, SE-100 44 Stockholm, Sweden. They can also be sent by e-mail to druck@kth.se. Applications sent to any other address will not be considered.

Scientific questions can be directed to: Carel Faber for Algebraic geometry, faber@kth.se; Michael Benedicks for Dynamical systems, michaelb@kth.se; Anders Björner for Combinatorics, bjorner@kth.se; Håkan Hedenmalm for Complex analysis, haakanh@kth.se; Kurt Johansson, Ari Laptev or Jens Hoppe for Mathematical physics and Spectral theory, kurtj@kth.se, laptev@kth.se, hoppe@kth.se; Pär Kurlberg for Number theory, kurlberg@kth.se; and Henrik Shahgholian for Partial differential equations, henriksh@kth.se.

PRESENTATION AV EXAMENSARBETE I MATEMATIK

Simon Wikander:
Turings maskin, beräkningsbarhet och avgörbarhetsproblemet

Handledare: **Rikard Bøgvad.**

Sammanfattning: Detta är en beskrivning och förklaring av Alan Turings arbete om sin maskin med utgångspunkt i hans artikel "On computable numbers with an application to the Entscheidungsproblem" från 1936.

Jag visar hur Turingmaskiner fungerar och arbetar och hur vi med hjälp av dessa kan definiera de beräkningsbara talen och mer generellt även beräkningsbarhet. Efter detta konstrueras den universella Turingmaskinen, en maskin som kan ta en annan Turingmaskin som indata.

Med hjälp av denna maskin visas det att det finns en sats i första ordningens predikatlogik som är oavgörbar, och därigenom löser vi avgörbarhetsproblemet med en negativ lösning.

Tid och plats: Onsdagen den 25 november kl. 10.00 – 11.00 i sal 21, hus 5, Matematiska institutionen, SU, Kräftriket.

GRADUATE STUDENT SEMINAR

Kathrin Vorwerk:
What is: "Combinatorial fixed point theorems"?

Abstract: We will explore combinatorial analogues to topological fixed point theorems. We present some applications among graph colouring, fair division and embeddability problems. If time permits, we will consider similar results as seen for Z_2 for general groups.

The talk aims to be introductory and suitable for all graduate students.

Tid och plats: Fredagen den 27 november kl. 13.15 – 14.15 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

KTH/SU MATHEMATICS COLLOQUIUM

Laurent Bartholdi:
Insanely twisted rabbits

Abstract: (Topological) branched coverings of the sphere, modulo a natural ("isotopy") relation, are interesting combinatorial objects; and a result by Thurston explains, at least theoretically, when such a covering is equivalent to a rational map. I will explain how such coverings can be conveniently encoded in group theory, and how that language can be used to answer a long-standing open problem by Douady and Hubbard, the "Twisted rabbit problem". I will then discuss visualizations of "matings" of polynomials (the topological branched covering obtained from gluing together two polynomials at infinity) through the same method.

This is joint work with Volodya Nekrashevych.

Tid och plats: Onsdagen den 2 december kl. 16.00 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Kaffe/te serveras kl. 15.30 i pausrummet, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 4.

KOMBINATORIKSEMINARIUM

Anders Björner:
A simplicial complex in number theory

Abstract: Let Δ_n be the simplicial complex of squarefree positive integers less than or equal to n ordered by divisibility. It is known that the asymptotic rate of growth of its Euler characteristic is closely related to deep properties of the prime number system, such as the Prime Number Theorem and the Riemann Hypothesis.

The talk will be about the asymptotic growth behaviour of the individual Betti numbers $\beta_k(\Delta_n)$ and of their sum. We show that Δ_n has the homotopy type of a wedge of spheres and that

$$\sum_k \beta_k(\Delta_n) = \frac{2n}{\pi^2} + O(\sqrt{n})$$

and, for fixed k

$$\beta_k(\Delta_n) \sim \frac{n}{2\log n} \frac{(\log\log n)^k}{k!}.$$

The talk will be quite general and elementary, assuming no specialized background.

Tid och plats: Onsdagen den 25 november kl. 10.15 – 11.15 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

SEMINARIUM I MATEMATISK STATISTIK

Daniel Alai:
Prediction Uncertainty in Stochastic Claims Reserving Methods

Abstract: Often in non-life insurance, claims reserves are the largest item on the liability side of the balance sheet. Therefore, given the available information about the past, the prediction of an adequate amount to face the responsibilities assumed by the non-life insurance company as well as the quantification of the uncertainties in these reserves are major issues in actuarial practice and science. We build on the capabilities of classical claims reserving methods and provide underlying stochastic model assumptions in order to ascertain the level of uncertainty.

Tid och plats: Måndagen den 30 november kl. 15.15 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

SEMINAR IN FLUID MECHANICS

Peter Davidson:
Structure formation in rotating turbulence

Abstract: It is commonly observed that the large scales in rotating turbulence are dominated by columnar structures. The received wisdom is that such structures are created by the non-linear interaction of inertial waves; so-called resonant triad interactions. We demonstrate that this is not the case and that the real explanation for the columnar eddies is much simpler.

Tid och plats: Torsdagen den 3 december kl. 10.30 i seminarierummet, Institutionen för mekanik, KTH, Teknikringen 8.

ALGEBRA AND GEOMETRY SEMINAR

Roy Skjelnes:
Quotients by equivalence relations of schemes

Abstract: The quotient of a scheme by an equivalence relation is a natural thing to consider, but unfortunately the quotient is not necessarily a scheme.

The usual trick to remedy this problem is to consider schemes as functors, and form the quotients in this larger category. However, functors in general are not determined by local data, and are therefore far from being schemes. Thus, when we form the quotient we also sheafify the quotient functor in some appropriate Grothendieck topology.

A quotient sheaf might be representable by a scheme in some topology, and not representable in other topologies. In many situations, however, the quotient sheaves are not representable by schemes. A natural question is then to determine which topology one should choose to sheafify the quotient within?

In the talk I will try to explain these notions. No a priori knowledge of these objects or concepts are needed to understand the talk, but some familiarity of schemes will be assumed.

Tid och plats: Onsdagen den 25 november kl. 13.15 – 14.15 i rum 306, hus 6, Matematiska institutionen, SU, Kräftriket.

INSTITUT MITTAG-LEFFLER SEMINAR

Hajime Ishihara:
A boundedness principle in constructive reverse mathematics

Abstract: A subset S of N is bounded if there exists K such that $s < K$ for all s in S; pseudobounded if $\lim s_n/n = 0$ for each sequence (s_n) in S. It is easy to see that if S is bounded, then it is pseudobounded. We will deal with the following boundedness principle in the context of constructive reverse mathematics.

BD-N. Each countable pseudobounded subset of N is bounded.

The boundedness principle BD-N is provable in the weak classical system RCA_0, derivable from an intuitionistic principle — a version of Brouwer's continuity principle (WC-N), and derivable from the principles of constructive recursive mathematics, that is, Extended Church's thesis (ECT_0) and Markov's principle (MP).

However, Peter Lietz (2004) showed that BD-N is not provable in $\mathrm{E\text{-}HA}^\omega + \mathrm{AC}$ — a natural formal system for Bishop's constructive mathematics. We will give a survey of the boundedness principle BD-N, its equivalents and the recent results in constructive reverse mathematics.

Tid och plats: Onsdagen den 25 november kl. 15.30 – 16.30 vid Institut Mittag-Leffler, Auravägen 17, Djursholm.

KOMBINATORIKSEMINARIUM

Hanna Uscka-Wehlou:
Some combinatorial problems related to digital straight lines with irrational slopes and to balanced aperiodic words

Abstract: There is a very close relationship between digital straight lines and binary words with the property of balance. During my Ph.D. studies I described, by means of continued fractions, the run hierarchical structure of digital straight lines (equivalently, of upper mechanical words) with irrational positive slopes less than one. I defined two equivalence relations on the set of slopes. Both relations are defined on the continued fraction elements of the slopes and they have their interpretation in the run hierarchical structure. This causes some questions with combinatorial nature, for example, about the description of the continued fraction expansion of slopes in each equivalence class. Another combinatorial piece is the fixed point theorem for the lines and words. The fixed points are the lines (words) with self-balanced construction in terms of long and short runs on all digitization levels.

Tid och plats: Onsdagen den 2 december kl. 10.15 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

SEMINARIUM I TEORETISK DATALOGI

Peter Jonsson:
Introduction to supercompilation

Abstract: High levels of abstraction, the possibility to reason about software components in isolation, and the ability to compose different components together are crucial to improve productivity in software development. A pure functional language gives the ability to reason equationally about programs, along with features such as higher-order functions that aid programmer productivity. While these mechanisms increase productivity, they also come with a problem known as the 'abstraction penalty': as the programmer increases the abstraction level to deal with system complexity, the performance of the resulting program decreases.

I will show, through examples, how the abstraction penalty can be automatically removed through supercompilation. Anyone who has taken a basic course in functional programming should be able to follow my examples. I will briefly survey previous work and identify some open problems.

Tid och plats: Torsdagen den 3 december kl. 10.15 i rum 1537, KTH CSC, Lindstedtsvägen 3, plan 5.
