BRÅKET

Information om seminarier och högre undervisning i matematiska ämnen i Stockholmsområdet

NR 26 **FREDAGEN DEN 28 AUGUSTI 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 3 september kl. 13.00.

Kurser

Andreas Axelsson: Geometric multilinear analysis. Se sidan 6.

Torsten Ekedahl: Algebraic Geometry. Se sidan 3.

Pär Kurlberg: Reading course on computational number theory. Se sidan 4.

Henrik Shahgholian: Obstacle problems in mathematical physics and industry. Se sidan 2.

SEMINARIER

Må 08–31 kl. 15.15 – 16.00. Seminarium i finansiell matematik. David Karlgren presenterar sitt examensarbete: *Random testing of a market place system. Simulation of a market place.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 25 sidan 5.

On 09–02 kl. 10.15 – 12.00. Kombinatorikseminarium. Anders Björner, KTH: *A q-analogue of the FKG inequality and some applications.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 3.

On 09–02 kl. 13.15 – 14.15. Algebra and Geometry Seminar. Joakim Arnlind: *Noncommutative algebras related to Poisson structures on the intersection of hypersurfaces.* Rum 306, hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 3.

Fortsättning på nästa sida.

Disputation i optimeringslära och systemteori

Tove Gustavi skall disputera på avhandlingen *Control and Coordination of Mobile Multi-Agent Systems* fredagen den 4 september kl. 10.00 i sal F3, KTH, Lindstedtsvägen 26, b.v. Se Bråket nr 25 sidan 6.

Disputation i numerisk analys

Måns Elenius skall disputera vid SU på avhandlingen *Computer Simulations of Simple Liquids with Tetrahedral Local Order: the Supercooled Liquid, Solids and Phase Transitions* fredagen den 11 september kl. 10.15. Se sidorna 5 – 6.

A Celebration of the Field of Systems and Control

Ett symposium med denna titel skall äga rum vid KTH den 9 – 11 september. Se sidorna 7 – 8.

Seminarier (fortsättning)

On 09–02 kl. 14.30 – 15.30. KCSE (KTH Computational Science and Engineering Centre) Seminar. Yana Di: *Simulations using a multi-mesh adaptive method.* PDC:s seminarierum, KTH, Teknikringen 14, plan 3. Se Bråket nr 25 sidan 5.

Fr 09–04 kl. 13.15 – 14.15. Graduate Student Seminar. Michael Björklund: *The Lindenstrauss maximal inequality.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 4.

On 09–09 kl. 13.00. Seminarium i statistik. Feng Li, Statistiska institutionen, SU: *Flexible modelling of conditional distributions using smooth mixtures of asymmetric Student t densities.* Sal B705, Statistiska institutionen, SU, Universitetsvägen 10B, plan 7, Frescati. Se sidan 6.

On 09–09 kl. 13.15. Algebra and Geometry Seminar. Gregory G. Smith: *Smooth and irreducible multigraded Hilbert schemes.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

On 09–09 kl. 16.00. KTH/SU Mathematics Colloquium. Professor Jürg Kramer, Humboldt-Universität zu Berlin: *Irrationality of* $\sqrt{2}$ *and Arakelov Geometry.* 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 4.

On 09–09 kl. 18.00 – 19.00. Offentlig föreläsning på Kungl. Vetenskapsakademien. Gunilla Svensson, SU: *Varför smälter isen?* Beijersalen, Kungl. Vetenskapsakademien, Lilla Frescativägen 4A, Stockholm. Se sidan 5.

COURSE IN MATHEMATICS

Obstacle problems in mathematical physics and industry
(7.5 course credit, fall 2009)

Course leader: **Henrik Shahgholian,** 08-790 67 54, henriksh@math.kth.se.

Schedule: Tuesdays at 13.15 – 15.00 in seminar room 3733, Department of Mathematics, KTH, Lindstedtsvägen 25, floor 7. The course will start on September 15.

Language: English.

Goal: To learn about certain problems in mathematical physics related to industrial problems. The prime goal, besides learning about how mathematics — and especially partial differential equations — can be used to formulate problems in physics, mechanics, finance, biology, and industry, is to introduce students to real-world problems and problems in the frontier of active research. The course can be seen as an introduction to the topic "Free Boundary Problems", and there are possibilities of further study and "Examensarbete" in mathematics.

For more details about the course (course literature, topics, prerequisites, and examination), see the homepage
http://www.math.kth.se/~henriksh/Henriks_page/Graduate-Courses/obstacle-frame.html.

Welcome!
Henrik Shahgholian

KOMBINATORIKSEMINARIUM

Anders Björner:
A q-analogue of the FKG inequality and some applications

Abstract: The FKG inequality of Fortuin, Kasteleyn and Ginibre (1971) originated as a correlation inequality in statistical mechanics. It has many applications in discrete probability and extremal combinatorics.

In this talk we derive a polynomial coefficient-wise inequality that refines the original FKG inequality. This polynomial FKG inequality has applications to f-vectors of joins of simplicial complexes, to Betti numbers of intersection of certain Schubert varieties, and to power series weighted by Young tableaux.

The latter case includes a correlation inequality for the so-called poissonization of Plancherel measure on symmetric groups, a probability measure on the set of all integer partitions.

The talk will be quite elementary and no previous familiarity with these topics will be assumed.

Tid och plats: Onsdagen den 2 september kl. 10.15 – 12.00 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

ALGEBRA AND GEOMETRY SEMINAR

Joakim Arnlind:
Noncommutative algebras related to Poisson structures on the intersection of hypersurfaces

Abstract: Noncommutative versions of manifolds can be defined in many different ways, depending on both aim and original motivation. In this talk, I will define a Poisson structure on the intersection of $d-2$ hypersurfaces in $\mathbb{R}^d$, where each hypersurface is described as the zero set of a polynomial in d variables. A noncommutative algebra A is then defined via a set of relations, which are obtained from the structure of the Poisson algebra on the intersection, and A may be regarded as a "noncommutative coordinate ring". For specific families of hypersurfaces, it turns out that the (hermitian) representation theory of A respects certain geometric properties of the intersection. Apart from some remarks on the general low-degree cases, I will present a family of hypersurfaces (of varying geometry) that provides an example where one can explicitly study the relationship between geometry and representation theory.

Tid och plats: Onsdagen den 2 september kl. 13.15 – 14.15 i rum 306, hus 6, Matematiska institutionen, SU, Kräftriket.

GRADUATE COURSE IN MATHEMATICS

Torsten Ekedahl: Algebraic Geometry

Kursen startar fredagen den 11 september kl. 13.15 – 15.00 i rum 306, hus 6, Matematiska institutionen, SU, Kräftriket (se Bråket nr 25 sidan 4). De som är intresserade av att deltaga i kursen men som inte kan komma till det första mötet uppmanas att skicka ett meddelande till Torsten Ekedahl (teke@math.su.se) med önskemål om tider för den fortsatta undervisningen.

GRADUATE STUDENT SEMINAR

Michael Björklund:
The Lindenstrauss maximal inequality

Abstract: Ever since Wiener's generalization of Birkhoff's ergodic theorem to higher rank abelian groups, the question whether an analogous ergodic theorem holds for all amenable groups has attracted a lot of attention.

Many partial results appeared in the literature until E. Lindenstrauss published his extremely clever solution to this problem in 1999. The gist of Lindenstrauss' proof is a far-reaching generalization of Hardy-Littlewood's maximal inequality, which is proved using very innovative random covering lemmata. In this talk I hope to cover Lindenstrauss' proof of this generalization.

Tid och plats: Fredagen den 4 september kl. 13.15 – 14.15 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

KTH/SU MATHEMATICS COLLOQUIUM

Jürg Kramer:
Irrationality of $\sqrt{2}$ and Arakelov Geometry

Abstract: Starting with the well-known proof of the irrationality of $\sqrt{2}$, we would like to show in our talk how this proof has significantly influenced the development of modern Diophantine Geometry. A key notion in this respect is the height of a rational point on an algebraic curve or, more generally, on an algebraic variety. It will be shown how this notion can be used to derive results on the set of rational points on algebraic varieties and how it can be further generalized by means of Arakelov Geometry to higher-dimensional objects in order to measure their arithmetic complexity.

Tid och plats: Onsdagen den 9 september 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.

GRADUATE COURSE IN MATHEMATICS

Reading course on computational number theory

Course leader: **Pär Kurlberg.**

Organization (rough sketch): During the first period of the fall semester 2009 (weeks 36 – 44 or so), we will have weekly meetings where (mainly) the participants will take turns giving brief lectures, followed by the audience discussion of any remaining "sticky points".

Weekday to meet: to be determined (depends on the participants' wishes, see below).

Organizational meeting: A short organizational meeting will be held at 15.30 on Monday, August 31, in seminar room 3721, Department of Mathematics, KTH, Lindstedtsvägen 25, floor 7. If you cannot participate at this meeting, please contact Pär Kurlberg (kurlberg@math.kth.se) to have your scheduling wishes heard.

For more details about the course (course literature and topics), see the homepage http://www.math.kth.se/~kurlberg/compnt09/.

Welcome!
Pär Kurlberg

OFFENTLIG FÖRELÄSNING PÅ KUNGL. VETENSKAPSAKADEMIEN

Gunilla Svensson:
Varför smälter isen?

Föreläsare: Gunilla Svensson arbetar vid Stockholms universitet. Hon disputerade vid Uppsala universitet 1995. Efter en postdoktoral vistelse vid Caltech i USA kom hon till SU 1998. Hennes specialområde är småskaliga meteorologiska processer som turbulens och moln och hur dessa är beskrivna i globala klimatmodeller. Hon har ett aktivt samarbete med den globala modelleringsgruppen på NCAR i USA.

Sammanfattning: Varför smälter isen? Bevisen för att ökade halter av växthusgaser i atmosfären leder till varmare klimat blir mer och mer övertygande. Förändringarna verkar gå snabbast i Arktis, där vi under senare år sett en dramatisk minskning av isutbredningen i slutet av smältsäsongen och att mängden flerårsis har minskat. Att isen smälter i ett varmare klimat är inte så märkligt, men varför temperaturen stiger snabbare i Arktis än globalt finns det fortfarande många frågetecken kring. Processer på lokal, regional och global skala har betydelse. Vilka dessa processer är och hur väl de är beskrivna i globala klimatmodeller kommer att diskuteras.

Tid och plats: Onsdagen den 9 september kl. 18.00 – 19.00 i Beijersalen, Kungl. Vetenskapsakademien, Lilla Frescativägen 4A, Stockholm.

DISPUTATION I NUMERISK ANALYS

Måns Elenius

skall disputera vid SU på avhandlingen

Computer Simulations of Simple Liquids with Tetrahedral Local Order: the Supercooled Liquid, Solids and Phase Transitions

fredagen den 11 september 2009 kl. 10.15 i Sydvästra galleriet, KTHB, Osquars Backe 31. Till opponent har utsetts *University Lecturer Jonathan Doye,* University of Oxford.

Abstract of the thesis

The understanding of complex condensed matter systems is an area of intense study. In this thesis, some properties of simple liquids with strong preference for tetrahedral local ordering are explored. These liquids are amenable to supercooling, and give complex crystalline structures on eventual crystallization. All liquids studied are simple, monatomic and are similar to real metallic liquids.

The vibrational density of states of a glass created in simulation is calculated. We show a correspondence between the vibrational properties of the crystal and the glass, indicating that the vibrational spectra of crystals can be used to understand the more complex vibrational spectra of the glass of the same substance.

The dynamics of supercooled liquids is investigated using a previously not implemented comprehensive measure of structural relaxation. This new measure decays more slowly in the deeply supercooled domain than the commonly used measure.

A new atomic model for octagonal quasicrystals is presented. The model is based on findings from a molecular dynamics simulation that resulted in 45° twinned β-Mn. A decoration is derived from the β-Mn unit cell and the unit cell of the intermediate structure found at the twinning interface.

(Continued on the next page.)

Extensive simulations are used to explore the phase diagram of a liquid at low densities. The resulting phase diagram shows a spinodal line and a phase coexistence region between a liquid and a crystalline phase ending in a critical point. This contradicts the old conclusion of the Landau theory — that continuous transitions between liquids and crystals cannot exist.

The same liquid is explored at higher densities. Upon cooling the liquid performs a first order liquid-liquid phase transition. The low temperature liquid is shown to be strong and to have very good glass forming abilities. This result offers new insights into fragile to strong transitions and suggests the possibility of a good metallic glass former.

GRADUATE COURSE IN MATHEMATICS

Geometric multilinear analysis

Teacher: **Andreas Axelsson.**

During the autumn semester I will give a graduate course on *geometric multilinear analysis* based on a monograph with the same title that I am writing. The subject of the course is classical, exterior algebra and Clifford algebra, but the presentation is new. The emphasis is on the geometrical and analytical aspects of the theory, which gives a modern unified approach to linear algebra, vector and several variables calculus and complex analysis in general affine and euclidean spaces.

Besides PhD students, advanced undergraduates should be able to benefit from the course, and parts may also be of interest to experienced mathematicians as there will be many novelties in the exposition. You find more information, including a more detailed presentation of the course, on its homepage http://kurser.math.su.se/course/view.php?id=350.

The course will take place on Wednesdays at 10.15 – 12.00 in room 306, house 6, Department of Mathematics, SU, Kräftriket, starting on September 9.

Welcome!
Andreas Axelsson

SEMINARIUM I STATISTIK

Feng Li:
Flexible modelling of conditional distributions using smooth mixtures of asymmetric Student t densities

Abstract: A general model is proposed for exibly estimating the density of a continuous response variable conditional on a possibly high-dimensional set of covariates. The model is a finite mixture of asymmetric Student t densities with covariate dependent mixture weights. The four parameters of the components, the mean, degrees of freedom, scale and skewness, are all modelled as functions of the covariates. Inference is Bayesian and the computation is carried out using Markov chain Monte Carlo simulation. To enable model parsimony, a variable selection prior is used in each set of covariates and among the covariates in the mixing weights. The model is used to analyse the distribution of daily stock market returns, and shown to more accurately forecast the distribution of returns than other widely used models for financial data.

The seminar is based on a joint work with Mattias Villani and Robert Kohn.

Tid och plats: Onsdagen den 9 september kl. 13.00 i sal B705, Statistiska institutionen, SU, Universitetsvägen 10B, plan 7, Frescati.

A CELEBRATION OF THE FIELD OF SYSTEMS AND CONTROL

An international symposium with this title will take place at KTH on September 9 – 11, 2009.

There will be a single stream of invited presentations during the three days when the symposium is held. The symposium is being organized on the occasion of two milestones in the careers of Chris Byrnes and Anders Lindquist.

The lectures will take place in lecture hall E1, KTH, Lindstedtsvägen 3, ground-floor.

Organizing committee: Xiaoming Hu, Ulf Jönsson, Bo Wahlberg, and Bijoy Ghosh.

Conference homepage: http://www.math.kth.se/optsyst/symposium/bl.html.

Wednesday, September 9

8.30 – 9.15 Registration.
9.15 – 9.30 Opening remarks.
9.30 – 10.00 **John Baillieul:** *Searching for solutions to random problems.*
10.00 – 10.30 **Tom Banks:** *Propagation of uncertainty in structured dynamical systems.*
10.30 – 11.00 Coffee break.
11.00 – 11.30 **Jan Willems:** *Ports and terminals.*
11.30 – 12.00 **John Burns:** *A distributed parameter control approach to optimal actuator and sensor placement for control, filtering and smoothing.*
12.00 – 12.30 **Xiren Cao:** *Dynamic programming vs direct comparison in optimization.*
12.30 – 14.00 Lunch break.
14.00 – 14.30 **Daizhan Cheng:** *A survey on boolean control networks.*
14.30 – 15.00 **Tryphon Georgiou** and **Allen Tannenbaum:** *Sparse blind source deconvolution with application to high resolution frequency analysis.*
15.00 – 15.30 **Michel Gevers:** *Connecting identifiability, informativity, information matrix and transfer of excitation in Prediction Error Identification.*
15.30 – 16.00 Coffee break.
16.00 – 16.30 **Graham Goodwin:** *Sequential Bayesian filtering via minimum distortion quantization.*
16.30 – 17.00 **Lei Guo:** *On the limits of feedback in dealing with uncertainties.*
17.00 – 17.30 **Uwe Helmke:** *Decidability criteria for unimodular equivalence of polynomial matrices.*
18.30 – 20.00 Reception at Lindstedtsvägen 15, KTH.

Thursday, September 10

9.00 – 9.30 **Anthony Bloch:** *Control theory and integrable systems.*
9.30 – 10.00 **Hidenori Kimura:** *Reflex-type regulation of biped robot.*
10.00 – 10.30 **Michele Pavon:** *Application of a global inverse function theorem of Byrnes and Lindquist to a multivariable moment problem with complexity constraint.*
10.30 – 11.00 Coffee break.
11.00 – 11.30 **Arthur Krener:** *Principal tangent system reduction.*
11.30 – 12.00 **Alexander Kurzhansky:** *Multiagent control synthesis under state constraints.*
12.00 – 12.30 **Sanjoy Mitter:** *The variational view of nonlinear estimation.*
12.30 – 13.30 Lunch.
14.00 – 18.00 Sightseeing.
19.00 – 23.00 Banquet.

(Continued on the next page.)

Friday, September 11

9.30 – 10.00 **Manfred Morari:** *Low complexity model predictive control.*

10.00 – 10.30 **Stephen Morse:** *The convergence constant of a complete gossip sequence.*

10.30 – 11.00 Coffee break.

11.00 – 11.30 **Alberto Isidori:** *Advances on the problem of output regulation for non-minimum-phase systems.*

11.30 – 12.00 **Rodolphe Sepulchre:** *On the geometry of low-rank filtering.*

12.00 – 12.30 **Anders Rantzer:** *Distributed procedures for control synthesis.*

12.30 – 14.00 Lunch break.

14.00 – 14.30 **Joachim Rosenthal:** *Pole placement in characteristic p.*

14.30 – 15.00 **Jana Nemcova** and **Jan H. van Schuppen:** *Rational systems — Realization and identification.*

15.00 – 15.30 **Roger Brockett:** *Existence and synchronization of oscillations in some highly interconnected systems.*

15.30 – 16.00 Coffee break.

16.00 – 16.30 **Yutaka Yamamoto:** *Path integrals and Bezoutians for a class of infinite-dimensional systems.*

16.30 – 17.00 **György Michaletzky:** *Covariance extension approach to Nevanlinna-Pick interpolation, Kimura-Georgiou parameterization and regular solutions of Sylvester equations.*

17.00 – 17.30 **Giorgio Picci:** *Reciprocal processes, circulant band extension problems and maximum entropy.*