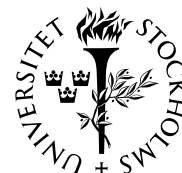




# BRÅKET



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

NR 41

FREDAGEN DEN 11 DECEMBER 2009

### BRÅKET

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

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KTH  
100 44 Stockholm

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Sista manustid för nästa nummer:  
Torsdagen den 17 december  
kl. 13.00.

### SEMINARIER

Fr 12–11 kl. 11.00–12.00. **Optimization and Systems Theory Seminar.** Anders Lindquist, Optimeringslära och systemteori, KTH: *What are moment problems and why are they useful in systems and control?* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 4.

Fr 12–11 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 Bråket nr 38 sidan 5.

Observera att Kathrin Vorwerks seminarium har flyttats till fredagen den 11 december. I Bråket nr 38 anges fel dag för detta seminarium.

Må 12–14 kl. 10.15. **Licentiatseminarium i mekanik.** David Tempelmann presenterar sin licentiatavhandling: *Stability and Receptivity of Three-Dimensional Boundary Layers*. Opponent: **Dr Stefan Hein**, DLR, Göttingen, Tyskland. Sal E35, KTH, Lindstedtsvägen 3, b.v. Se Bråket nr 40 sidan 8.

Fortsättning på nästa sida.

### Disputation i matematik

Daniel Schnellmann skall disputerar på avhandlingen *Viana maps and limit distributions of sums of point measures* torsdagen den 17 december kl. 10.00 i sal F3, KTH, Lindstedtsvägen 26, b.v. Se Bråket nr 40 sidan 10.

### Disputation i matematik

Samuel Lundqvist skall disputerar på avhandlingen *Computational algorithms for algebras* fredagen den 18 december kl. 10.00 i sal 14, hus 5, Matematiska institutionen, SU, Kräfteriket. Se Bråket nr 40 sidan 11.

### Kurs

Tomas Björk: Optimal control and filtering in continuous time, with engineering and finance applications. Se sidan 5.

**Seminarier (fortsättning)**

- Må 12–14 kl. 15.15–16.15. Matematiska kollokviet i Uppsala.** (*Observera dagen!*) **Ari Laptev**, KTH: *Spectrum of partial differential equations: From Weyl asymptotics to Lieb-Thirring inequalities*. Höggsalen, Ångströmlaboratoriet, Uppsala universitet. Kaffe/te serveras utanför föreläsningssalen kl. 14.55. Se sidan 3.
- Må 12–14 kl. 15.15–16.15. Seminarium i matematisk statistik.** **Professor Jörgen W. Weibull**, Handelshögskolan i Stockholm: *The Condorcet Jury Problem and Preference Heterogeneity*. Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 40 sidan 9.
- Må 12–14 kl. 16.20–17.05. Seminarium i finansiell matematik.** **Alexander Wojt** presenterar sitt examensarbete: *Portfolio Selection and Lower Partial Moments*. Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 3.
- Ti 12–15 kl. 10.15. Licentiatseminarium i mekanik.** **Johan Ohlsson** presenterar sin licentiatavhandling: *Spectral-element simulations of separated turbulent internal flows*. Opponent: **Professor Jesper Ooppelstrup**, Numerisk analys, KTH. Sal E3, KTH, Osquars Backe 14, 2 tr. Se Bråket nr 40 sidan 9.
- On 12–16 kl. 10.15–12.00. Kombinatorikseminarium.** **Svante Linusson**, KTH:  *$n!$  matchings,  $n!$  posets*. Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 4.
- On 12–16 kl. 11.00–12.00. KTH/Nordita/SU Seminar in Theoretical Physics.** **Georg M. Bruun**, Lund/NBI: *Antiferromagnetic noise correlations in optical lattices*. Sal FA31, Roslagstullsbacken 21, AlbaNova universitetscentrum. Se sidan 6.
- On 12–16 kl. 13.00. Seminarium i statistik.** **Pär Stockhammar**: *Density forecasting of the Dow Jones share index*. Sal B705, Statistiska institutionen, SU, Universitetsvägen 10B, plan 7, Frescati. Se Bråket nr 40 sidan 7.
- On 12–16 kl. 13.15–15.00. Algebra and Geometry Seminar.** **Boris Shapiro**, SU: *On some algebras associated with a simple graph*. Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 40 sidan 6.
- On 12–16 kl. 15.15. Licentiatseminarium i matematisk statistik.** **Anne Wangombe** presenterar sin licentiatavhandling: *Stochastic epidemic models for tick-borne diseases*. Inbjuden diskussionsinledare: **Professor Ziad Taib**, AstraZeneca och Chalmers tekniska högskola. Rum 306 (Cramérrummet), hus 6, Matematiska institutionen, SU, Kräftriket. Se Bråket nr 40 sidan 5.
- On 12–16 kl. 16.00. KTH/SU Mathematics Colloquium.** **Sandra Di Rocco**, KTH: *Interaction between Convex and Algebraic 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 Bråket nr 40 sidan 10.
- On 12–16 kl. 18.00–19.00. Offentlig föreläsning på Kungl. Vetenskapsakademien.** **Professor Ola Hössjer**, Matematisk statistik, SU: *Matematisk statistik och genetning*. Beijersalen, Kungl. Vetenskapsakademien, Lilla Frescativägen 4A, Stockholm. Se Bråket nr 40 sidan 4.
- Ola Hössjers föreläsning föregås av utdelningen av Tobiaspriset. Detta är ett medicinskt forskningsstipendium med anknytning till benmargstransplantationer.*

**Fortsättning på nästa sida.**

**Seminarier (fortsättning)**

**To 12–17 kl. 13.15–14.15. Extra Algebra and Geometry Seminar.** (*Observera dagen!*)  
Mikael Vejdemo-Johansson, Stanford University: *Gröbner bases for operads*.  
Rum 306, hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 5.

**To 12–17 kl. 15.15–16.15. AlbaNova and Nordita Colloquium in Physics.** Ulf  
Leonhardt, University of St Andrews, UK: *Geometry, light and a wee bit of  
magic*. Oskar Kleins auditorium, Roslagstullsbacken 21, AlbaNova universitets-  
centrum. Se Bråket nr 40 sidan 11.

**MATEMATISKA KOLLOKVIET I UPPSALA****Ari Laptev:****Spectrum of partial differential equations:  
From Weyl asymptotics to Lieb-Thirring inequalities**

*Abstract:* The study of the relationship between geometry and spectral properties is one of the oldest subjects of human interest. More than two thousand years ago the Pythagoreans had already discovered connections between the length of a string and the tone it produced. Nowadays, one meets situations in most areas of Physics and Engineering, where it is important to ascertain how shape determines the frequencies of vibrations and their distribution.

The spectral analysis of differential operators plays a crucial role in the area of Mathematical Physics and, in particular, in Quantum Mechanics. Many phenomena can be described in terms of the discrete and continuous spectrum of a linear operator. When studying the discrete spectrum, one is often interested in regimes where a certain parameter is either very large or very small. A mathematically rigorous analysis usually requires not only the study of the asymptotic behaviour of the relevant quantities, but also a careful bound on approximation errors. This is where spectral estimates play a central part in the proof. The celebrated inequalities by Lieb-Thirring, for example, are of importance in the theory of the Stability of Matter and in the Turbulence Theory.

*Tid och plats:* Måndagen den 14 december kl. 15.15–16.15 i Höggsalen, Ångströmlaboratoriet, Uppsala universitet. Kaffe/te serveras utanför föreläsningssalen kl. 14.55.

**SEMINARIUM I FINANSIELL MATEMATIK****Alexander Wojt**

presenterar sitt examensarbete:

**Portfolio Selection and Lower Partial Moments**

*Abstract:* In this thesis lower partial moments (LPM) are introduced as risk measures in portfolio optimization (mean-LPM optimization). LPM has several features making it a more suitable risk measure for the investor compared to variance. Empirical tests will be carried out to compare mean-variance optimization with mean-LPM optimization. The results will be discussed in light of a robustness analysis under a resampled efficiency framework (Michaud, 1998), performed in order to discuss the models' sensitivities to estimation errors.

*Tid och plats:* Måndagen den 14 december kl. 16.20–17.05 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

## OPTIMIZATION AND SYSTEMS THEORY SEMINAR

**Anders Lindquist:**

### What are moment problems and why are they useful in systems and control?

*Abstract:* Moment problems are ubiquitous throughout engineering, mathematics and science, and particularly at their interface. Power moments of probability measures play an important role in partial statistical modelling and in its application to information theory, communications, signals and systems. Applications of the trigonometric moment problem to systems and control also have a long and fruitful history, including the rational covariance extension problem for modelling a finite time window of a stochastic process. Analytic interpolation problems are an important class of moment problems with applications to circuit theory, power systems, robust control, signal processing, spectral estimation and stochastic realization theory. Moment problems are typically underdetermined and give rise to families of particular solutions, and finding a solution that also satisfies a natural optimality criterion or design specification is an important general problem. In this lecture we pose and solve a nonclassical version of this problem (which we call the moment problem for positive rational measures) that reflects the importance of rational functions in signals, systems and control. While this version of the problem is decidedly nonlinear, there exists a natural, universal family of strictly convex optimization criteria defined on the convex set of particular solutions. This provides a powerful paradigm for smoothly parameterizing, comparing and shaping the solutions based on various additional design criteria. It also enables us to establish the smooth dependence of solutions on problem data. During this lecture, we will motivate and illustrate these results by applications to robust control and signal processing.

This is a “rehearsal lecture” for a one-hour address at the 2009 IEEE Decision and Control Conference in Shanghai in December.

*Tid och plats:* Fredagen den 11 december kl. 11.00–12.00 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

## KOMBINATORIKSEMINARIUM

**Svante Linusson:**

### $n!$ matchings, $n!$ posets

*Abstract:* I will present recent work joint with Anders Claesson. We study the class of matchings on the set  $[2n]$  that contain no left-neighbour nesting. That is, matchings such that if  $i$  is matched to  $j$ ,  $j > i$ , and  $i + 1$  is matched to  $k$ ,  $k > i + 1$ , then  $j < k$ . We also define a class of naturally labelled  $2 + 2$ -free posets, called factorial posets. Bijections are given between both these sets of objects and permutations and hence they are both enumerated by  $n!$ . Our inspiration has come from the work of Bousquet-Mélou, Claesson, Dukes and Kitaev [arXiv:0806.0666] presented in our seminar in April by Claesson. (See Bråket 2009 no. 16, page 6.) It follows from our work that in their work one could replace “nesting” with “crossing”. I will also show nice bijections between matchings with neighbour restrictions and certain upper-triangular matrices.

I will state several conjectures concerning the distribution of patterns and enumeration of certain matchings.

*Tid och plats:* Onsdagen den 16 december kl. 10.15–12.00 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

## EXTRA ALGEBRA AND GEOMETRY SEMINAR

**Mikael Vejdemo-Johansson:**  
**Gröbner bases for operads**

*Abstract:* Gröbner bases hold a significant role in introducing computational and computer based techniques to the study of commutative, and later non-commutative, rings. At the core of the Gröbner basis approach is a systematic way to find a new basis for the ring in question that captures not only the additive, but also the multiplicative structure of the ring.

In a recent paper, Dotsenko and Khoroshkin draw up the relevant choices to construct a Gröbner basis theory for symmetric (and non-symmetric by extension) operads over the category of vector spaces. This allows for several interesting new techniques based on these definitions. For starters, being a multiplicative basis, a quadratic Gröbner basis forms a Poincaré-Birkhoff-Witt basis, and thus, by a result by Hoffbeck, in itself a proof of Koszul-arity for the operad in question. Furthermore, having a Gröbner basis means, by standard constructions, that there is a normal form for any expression, which opens up the theory of operads for computational approaches and tools.

In this talk, we will go through the essential definitions and intuitions leading up to the Dotsenko-Khoroshkin paper, and culminate in an overview of a recent computer implementation of the methods of Dotsenko-Khoroshkin, written by Dotsenko and the speaker.

*Tid och plats:* Torsdagen den 17 december kl. 13.15–14.15 i rum 306, hus 6, Matematiska institutionen, SU, Kräftriket.

## GRADUATE COURSE

**Tomas Björk:**  
**Optimal control and filtering in continuous time,  
 with engineering and finance applications**

*Professor Tomas Björk*, Stockholm School of Economics (Handelshögskolan i Stockholm), will deliver a Ph.D. course with the title given above (4 hp).

*Time and place:* Tuesdays and Thursdays at 10.15–12.00 in seminar room 3733, Department of Mathematics, KTH, Lindstedtsvägen 25, floor 7. The course will start on Tuesday, February 2, and end on Thursday, February 18, 2010.

### *Contents*

**1. Optimal control:** Dynamic programming and the HJB Equation, the Verification Theorem. The linear quadratic regulator. Optimal investment theory and the Merton fund separation theorems. The martingale approach to optimal investment problems.

**2. Filtering:** Nonlinear filtering and the Fujisaki-Kallianpur-Kunita equations. The Kalman and Wonham filters. Optimal control problems under partial observations. The partially observed linear quadratic regulator. Optimal investment under partial information.

Welcome!  
 Boualem Djehiche

**KTH/NORDITA/SU SEMINAR IN THEORETICAL PHYSICS****Georg M. Bruun:****Antiferromagnetic noise correlations in optical lattices**

*Abstract:* We analyse how noise correlations probed by time-of-flight (TOF) experiments reveal antiferromagnetic (AF) correlations of fermionic atoms in two-dimensional (2D) and three-dimensional (3D) optical lattices. Combining analytical and quantum Monte Carlo (QMC) calculations using experimentally realistic parameters, we show that AF correlations can be detected for temperatures above and below the critical temperature for AF ordering. It is demonstrated that spin-resolved noise correlations yield important information about the spin ordering. Finally, we show how to extract the spin correlation length and the related critical exponent of the AF transition from the noise.

*Tid och plats:* Onsdagen den 16 december kl. 11.00–12.00 i sal FA31, Roslagstullsbacken 21, AlbaNova universitetscentrum.

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