



BRÅKET



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

NR 9

FREDAGEN DEN 9 MARS 2007

BRÅKET

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

Redaktör: Gunnar Karlsson

Telefon: 08-790 84 79

Adress för e-post:
gunnarkn@math.kth.se

Bråket på Internet: <http://www.math.kth.se/braaket.html> eller
<http://www.math.kth.se/braket/>

Postadress:

Red. för Bråket
Institutionen för matematik
KTH
100 44 Stockholm

Sista manustid för nästa nummer:
Torsdagen den 15 mars kl. 13.00.

Disputation i matematik

Jonas Sjöstrand disputerar vid KTH på avhandlingen *Enumerative combinatorics related to partition shapes* fredagen den 23 mars kl. 13.15. Se sidan 13.

Ledig tjänst

SU söker en forskarassistent i matematisk statistik. Se sidan 12.

SEMINARIER

Fr 03–09 kl. 13.15–14.15. Graduate Student Seminar. Roy Skjelnes, Matematik, KTH: *Geometri för punkter*. Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 8 sidan 4.

Må 03–12 kl. 15.15–16.00. Seminarium i finansiell matematik. Mathias Tedesund presenterar sitt examensarbete: *Index Tracking under Fixed and Variable Transaction Costs*. Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 4.

Ti 03–13 kl. 10.15. Plurikomplexa seminariet. Christer Kiselman, Uppsala: *Fundamental solutions to a difference equation analogous to the Cauchy-Riemann equation*. Rum 306, hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 5.

Ti 03–13 kl. 14.00–15.00. Mittag-Leffler Seminar. Carl-Friedrich Bödigheimer, Universität Bonn: *Hilbert uniformization of Riemann surfaces*. Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 7.

Ti 03–13 kl. 15.30–16.30. Mittag-Leffler Seminar. Hsian-Hua Tseng, University of British Columbia: *Global quotient structure of moduli of orbifold stable maps*. Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 6.

Fortsättning på nästa sida.

Disputation i matematisk statistik

Andreas Nordvall Lagerås disputerar på avhandlingen *Markov Chains, Renewal, Branching and Coalescent Processes: Four Topics in Probability Theory* onsdagen den 14 mars kl. 13.00 i sal 14, hus 5, Matematiska institutionen, SU, Kräftriket. Se Bråket nr 8 sidan 8.

Seminarier (fortsättning)

- On 03–14 kl. 10.15–11.15. Kombinatorikseminarium. Henrik Eriksson, KTH:** *Integraler, partitioner och MacMahons sats*. Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 8.
- On 03–14 kl. 10.30. Logikseminariet Stockholm-Uppsala. (Observera lokalen!) Ruben van den Brink, Nijmegen:** *Why not? An intuitionist's attempt to understand "HB does not imply FT"*. (Fortsättning från seminariet den 7 mars.) Sal 11167, Ångströmlaboratoriet, Uppsala universitet.
- On 03–14 kl. 11.00–12.00. Common SU KoF/KTH Theoretical Physics Seminar. Daniel Grumiller, MIT:** *Introduction to black holes in two dimensions*. Sal FB41, Roslagstullsbacken 21, AlbaNova universitetscentrum. Se Bråket nr 8 sidan 5.
- On 03–14 kl. 13.00. Seminarium i statistik. Tatjana Nahtman:** *Title to be announced*. Sal B705, Statistiska institutionen, SU, Universitetsvägen 10B, plan 7, Frescati.
- On 03–14 kl. 13.15–14.15. Seminarium i analys och dynamiska system. Björn Gustafsson och Vladimir Tkachev, KTH:** *The resultant on compact Riemann surfaces and the exponential transform*. Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 5.
- On 03–14 kl. 13.15–15.00. Seminarium, arrangerat av Avdelningen för säkerhetsforskning, KTH. Lars Olsson, Geostatistik AB:** *Risker i byggande*. V:s seminarierum 156, KTH, Teknikringen 78 A, 1 tr. Se sidan 5.
- On 03–14 kl. 15.00–16.00. Presentation av examensarbete i matematik. (Observera tiden!) Gustaf Persson:** *Mellintransformen*. Handledare: Rikard Bøgvad. Sal 21, hus 5, Matematiska institutionen, SU, Kräftriket. Se sidan 8.
- On 03–14 kl. 16.00–17.00. KTH/SU Mathematics Colloquium. Arild Stubhaug:** *Mittag-Lefflers liv och verk — efter fem års studier i hans fotspår*. 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.
- To 03–15 kl. 11.00–12.00. Mittag-Leffler Seminar. Marco Manetti, Università di Roma:** *A deformation theoretic interpretation of Bloch's semiregularity map*. Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 9.
- To 03–15 kl. 14.00–15.00. Mittag-Leffler Seminar. Emma Previato, Boston University:** *Singular quadratic complexes and compactifications of moduli spaces of bundles*. Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 4.
- To 03–15 kl. 15.15–16.15. AlbaNova and Nordita Colloquium in Physics. Claes Fransson, Stockholms observatorium:** *Supernovae and the physics we have learnt from them*. Oskar Kleins auditorium, Roslagstullsbacken 21, AlbaNova universitetscentrum. Se sidan 6.
- To 03–15 kl. 15.30–16.30. Mittag-Leffler Seminar. Carl-Friedrich Bödigheimer, Universität Bonn:** *Symmetric groups and moduli spaces of Riemann surfaces*. Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 7.

Fortsättning på nästa sida.

Seminarier (fortsättning)

- Fr 03–16 kl. 11.00–12.00. Joint CIAM and Optimization and Systems Theory Seminar.** Per Kreuger, Swedish Institute of Computer Science, Kista: *Mixed integer-linear formulations of cumulative scheduling constraints*. Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 6.
Observera att Per Kreuger skall hålla sitt seminarium den 16 mars. I Bråket nr 8 anges fel datum för detta seminarium.
- Fr 03–16 kl. 13.15–14.15. Graduate Student Seminar.** Christian Lundkvist, Matematik, KTH: *The Grassmannian*. Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 10.
- Ti 03–20 kl. 14.00–15.00. Mittag-Leffler Seminar.** Timothy Logvinenko, KTH: *Non-commutative crepant resolutions and the arising moduli constructions*. Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 11.
- On 03–21 kl. 11.00. Common SU KoF/KTH Theoretical Physics Seminar.** Subhash Chaturvedi, Hyderabad: *Wigner distributions for qudits: Two approaches*. Sal FA31, Roslagstullsbacken 21, AlbaNova universitetscentrum. Se sidan 10.
- On 03–21 kl. 13.15–14.15. Seminarium i analys och dynamiska system.** Alexandru Aleman, Lund: *Title to be announced*. Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.
- On 03–21 kl. 15.15. Docentföreläsning i matematisk logik.** Fil. dr Vera Djordjevic: *Satisfiability in finite structures of statements in first-order logic*. Sal Å11167, Ångströmlaboratoriet, Uppsala universitet.
- To 03–22 kl. 11.00–12.00. Mittag-Leffler Seminar.** Sam Payne, University of Michigan: *Moduli of toric vector bundles*. Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 8.
- To 03–22 kl. 14.00–15.00. Mittag-Leffler Seminar.** Elena Kreines, Moscow State University: *Generalized Grothendieck dessins d'enfants and compactifications of moduli spaces*. Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 11.
- To 03–22 kl. 15.15–16.15. AlbaNova and Nordita Colloquium in Physics.** Anna Lipniacka, Institutt for Fysikk og Teknologi, Bergen: *The Large Hadron Collider, shining light on the dark side of the Universe*. Oskar Kleins auditorium, Roslagstullsbacken 21, AlbaNova universitetscentrum. Se sidan 7.
- To 03–22 kl. 15.30–16.30. Mittag-Leffler Seminar.** Orsola Tommasi, Johannes Gutenberg-Universität Mainz: *Discriminants and cohomology of moduli spaces of curves*. Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 11.
- Fr 03–23 kl. 10.00. Licentiatseminarium i datalogi.** Daniel Aarno presenterar sin licentiatavhandling: *Intention Recognition in Human Machine Collaborative Systems*. Opponent: Associate Professor Darius Burschka, Technische Universität München. Sal D31, KTH, Lindstedtsvägen 17, b.v. Se sidorna 9–10.
- Fr 03–23 kl. 10.15. Kombinatorikseminarium.** (*Observera tiden och lokalen!*) Professor Christian Krattenthaler, Universität Wien: *Growth diagrams, and increasing and decreasing chains in fillings of cell diagrams*. Sal D32, KTH, Lindstedtsvägen 5, b.v. Se sidan 12.
Professor Krattenthaler är opponent vid Jonas Sjöstrands disputation. Se sidan 13.

Fortsättning på nästa sida.

Seminarier (fortsättning)

Fr 03–23 kl. 13.15–14.15. Graduate Student Seminar. Stephanie Yang, Institut Mittag-Leffler: *Title to be announced*. Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

SEMINARIUM I FINANSIELL MATEMATIK**Mathias Tedesund**

presenterar sitt examensarbete:

Index Tracking under Fixed and Variable Transaction Costs

Abstract: The purpose of this thesis is to investigate how both fixed and variable transaction costs can be accounted for when managing an index tracking portfolio and how the trade-off between deviating from the benchmark and the size of transaction costs varies for different portfolios.

To do this we address the rebalancing problem of optimal tracking an index under fixed and proportional transaction costs. This is done within the mean variance framework by suggesting a simulation model, where we can test how different strategies affect the total transaction costs and the portfolio performance.

First, we describe a heuristic approach to deal with the fixed transaction costs function in the mean variance portfolio optimization procedure and apply it to a trading strategy including a tracking error target.

We further look at how a positive cash holding strategy can be used to control transaction costs and describe how optimal cash weight limits can be calculated, in presence of fixed and proportional transaction costs, using impulse control techniques.

Tid och plats: Måndagen den 12 mars kl. 15.15–16.00 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

MITTAG-LEFFLER SEMINAR**Emma Previato:****Singular quadratic complexes
and compactifications of moduli spaces of bundles**

Abstract: Peter E. Newstead (Topology 7, 1968) gave a geometric model for the moduli space of stable bundles of rank 2 and fixed odd determinant over a smooth curve of genus 2, namely the points of a smooth quadratic complex. He also (Math. Proc. Cambridge Philos. Soc. 91, 1982) revisited the classification of singular quadratic complexes.

In this joint work with Newstead, we consider a compactification of the space of stable rank-2 bundles with fixed odd determinant over certain singular curves of genus 2, and identify its normalization with appropriate singular quadratic complexes. We compare this with other constructions of compactifications of spaces of bundles over singular curves (work by Bhosle, Gieseker, Seshadri, e.g.).

A large part of the construction applies to curves of higher genus.

Tid och plats: Torsdagen den 15 mars kl. 14.00–15.00 vid Institut Mittag-Leffler, Aura-vägen 17, Djursholm.

PLURIKOMPLEXA SEMINARIET

Christer Kiselman:

**Fundamental solutions to a difference equation
analogous to the Cauchy-Riemann equation**

Abstract: I shall study a difference equation on the Gaussian integers which is analogous to the Cauchy-Riemann equation in one complex variable. The solutions to the homogeneous equation were called monodiffric functions of the second kind by Isaacs (1941) and they were later studied by Ferrand (1944). The equation has a fundamental solution with support in the first quadrant and which serves to prove existence of solutions to the inhomogeneous equation. This fundamental solution is closely connected to the Delannoy numbers known in combinatorics since 1895. There is also a bounded fundamental solution which can be defined using Fourier analysis.

Tid och plats: Tisdagen den 13 mars kl. 10.15 i rum 306, hus 6, Matematiska institutionen, SU, Kräftriket.

SEMINARIUM I ANALYS OCH DYNAMISKA SYSTEM

Björn Gustafsson och Vladimir Tkachev:

**The resultant on compact Riemann surfaces
and the exponential transform**

Abstract: We introduce a notion of resultant of two meromorphic functions on a compact Riemann surface and indicate its relationship to some more other objects, for example the polynomial giving the algebraic dependence between the two meromorphic functions. The concept is discussed from three distinct perspectives: complex analysis, elimination theory, and operator theory. Recall that the function of two complex variables defined by

$$E_{\Omega}(z, \bar{w}) = \exp \left[-\frac{1}{\pi} \int_{\Omega} \frac{dA(\zeta)}{(\zeta - z)(\bar{\zeta} - \bar{w})} \right],$$

where $dA(\zeta)$ stands for the Lebesgue planar measure, is called the exponential transform of a bounded domain Ω . It is well-known that $E_{\Omega}(z, \bar{w})$ is as an infinite determinant (Carey, Pincus, 1974); on the other hand, $E_{\Omega}(z, \bar{w})$ is rational provided Ω is a quadrature domain (Putinar, 1996). As a particular application, we show that the exponential transform of a quadrature domain in the complex plane is expressed in terms of the resultant of two meromorphic functions on the Schottky double of the domain.

Tid och plats: Onsdagen den 14 mars kl. 13.15–14.15 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

**SEMINARIUM, ARRANGERAT AV
AVDELNINGEN FÖR SÄKERHETSFORSKNING, KTH**

Lars Olsson: Risker i byggande

Sammanfattning: Seminariet kommer att behandla byggandets hot och risker, samhälls-krav samt metodik för riskhantering.

Tid och plats: Onsdagen den 14 mars kl. 13.15–15.00 i V:s seminarierum 156, KTH, Teknikringen 78 A, 1 tr.

MITTAG-LEFFLER SEMINAR**Hsian-Hua Tseng:****Global quotient structure of moduli of orbifold stable maps**

Abstract: Global quotient stacks (that is, stacks which are quotients of schemes by linear algebraic groups) form a particularly nice class of stacks. In the study of orbifold Gromov-Witten theory, properties of moduli of orbifold stable maps play an important role. In joint work with D. Abramovich, T. Graber, and M. Olsson, we prove that the moduli stack of orbifold stable maps to a quotient stack is a quotient stack. In this talk we will discuss the proof of this result and its consequences.

Tid och plats: Tisdagen den 13 mars kl. 15.30–16.30 vid Institut Mittag-Leffler, Aura-vägen 17, Djursholm.

ALBANOVA AND NORDITA COLLOQUIUM IN PHYSICS**Claes Fransson:****Supernovae and the physics we have learnt from them**

Abstract: The explosion of a core collapse supernova drives a powerful shock front into the wind from the progenitor star. A layer of shocked circumstellar gas and ejecta develops that is subject to hydrodynamic instabilities. The hot gas can be observed directly by its X-ray emission, some of which is absorbed and re-radiated at lower frequencies by the ejecta and the circumstellar gas. Synchrotron radiation from relativistic electrons accelerated at the shock fronts provides information on the mass loss density if free-free absorption dominates at early times or the size of the emitting region if synchrotron self-absorption dominates. Analysis of the interaction leads to information on the density and structure of the ejecta and the circumstellar medium, and the abundances in these media. The emphasis here is on the physical processes related to the interaction.

Tid och plats: torsdagen den 15 mars kl. 15.15–16.15 i Oskar Kleins auditorium, Roslags-tullsbacken 21, AlbaNova universitetscentrum.

**JOINT CIAM AND
OPTIMIZATION AND SYSTEMS THEORY SEMINAR****Per Kreuger:****Mixed integer-linear formulations
of cumulative scheduling constraints**

Abstract: This talk introduces two MILP models for the cumulative scheduling constraint and associated pre-processing filters. We compare standard solver performance for these models on three sets of problems, and for two of them, where tasks have unitary resource consumption, we also compare them with two models based on a geometric placement constraint.

In the experiments, the solver performance of one of the cumulative models is clearly the best and is also shown to scale very well for a large scale industrial transportation scheduling problem.

Tid och plats: Fredagen den 16 mars kl. 11.00–12.00 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

MITTAG-LEFFLER SEMINAR

Carl-Friedrich Bödigheimer:
Hilbert uniformization of Riemann surfaces

Abstract: We describe a cell complex which is homeomorphic to a vector bundle over the moduli space $M_{g,n}^m$ of surfaces with $n \geq 1$ boundary curves and $m \geq 0$ punctures.

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

MITTAG-LEFFLER SEMINAR

Carl-Friedrich Bödigheimer:
Symmetric groups and moduli spaces of Riemann surfaces

Abstract: The family of all symmetric groups can be regarded as a simplicial object and so the classifying spaces of all these groups can be amalgamated to form a bi-graded space. As a third parameter we use the word length of the group elements to filter it. It turns out that the stratum for the length $h = 2g + m + 2n - 2$ is the disjoint union of all moduli spaces $M_{g,n}^m$ of surfaces of genus $g \geq 0$ with $n \geq 1$ boundary curves and $m \geq 0$ punctures.

Tid och plats: Torsdagen den 15 mars kl. 15.30–16.30 vid Institut Mittag-Leffler, Auravägen 17, Djursholm.

ALBANOVA AND NORDITA COLLOQUIUM IN PHYSICS

Anna Lipniacka:
**The Large Hadron Collider,
 shining light on the dark side of the Universe**

Abstract: Known matter, capable of participating in chemical and nuclear reaction builds only 5 % of the Universe. We do not know why even this 5 % exists and what exactly makes it massive. Dark Matter, an unknown form of matter forming close to 23 % of the Universe is important at cosmological scales, binding galaxies and inducing structure formations. Can we produce Dark Matter in laboratory experiments and study its properties? Can we uncover the very reason for the existence of mass? Can we understand matter-antimatter asymmetry? Could all these questions be connected? In the 27 km long tunnel, previously belonging to Large Electron Positron (LEP) collider at CERN, the Large Hadron Collider is now located. It will start its operation in the fall. After many years of preparations the time zero is finally approaching. Teams of ATLAS and CMS, two multistory, general purpose detectors built with micrometer precision, are racing against time to get them ready for this year proton-proton collisions. In summer 2008 collisions at centre of mass energy of 14 TeV will start, exceeding by a factor of 10 what was previously achieved. Where will this leap take us and will we be able to understand what we see? Status report, educated guesses and speculations will be presented.

Tid och plats: Torsdagen den 22 mars kl. 15.15–16.15 i Oskar Kleins auditorium, Roslags-tullsbacken 21, AlbaNova universitetscentrum.

KOMBINATORIKSEMINARIUM

Henrik Eriksson:

Integraler, partitioner och MacMahons sats

Sammanfattning: MacMahon visade 1915 att ett heltal har lika många partitioner i delar delbara med 2 eller 3 som det har partitioner där varje del förekommer minst två gånger. Talet 7 kan partitioneras på två sätt som $2 + 2 + 3 = 3 + 4$ och på lika många sätt som $1 + 1 + 1 + 1 + 1 + 1 + 1 = 1 + 1 + 1 + 2 + 2$. Detta resultat har nu fått osannolika tillämpningar på områden som perkolation och integraler och har i sin tur lett till en generalisering av MacMahons sats. (Samarbete med George Andrews och Dan Romik.)

Tid och plats: Onsdagen den 14 mars kl. 10.15–11.15 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

PRESENTATION AV EXAMENSARBETE I MATEMATIK

Gustaf Persson: Mellintransformen

Handledare: **Rikard Bøgvad.**

Abstract: The Mellin transform is a close relative of the integral transforms of Laplace and Fourier. A major use of Mellin transforms is in asymptotic analysis. The thesis starts with basic and fundamental properties of the Mellin transform. Then there is a discussion about the fundamental correspondence between asymptotic expansion of an original function and the singular expansion of its transform. The main application in this thesis is to use this fundamental correspondence to find the pole or the Riemann zeta function.

Tid och plats: Onsdagen den 14 mars kl. 15.00–16.00 i sal 21, hus 5, Matematiska institutionen, SU, Kräftriket.

MITTAG-LEFFLER SEMINAR

Sam Payne:

Moduli of toric vector bundles

Abstract: I will describe a construction of the moduli stack of rank r equivariant vector bundles on an arbitrary toric variety as a quotient of a fine moduli scheme of framed equivariant vector bundles by a linear group action. This construction is “typical” in the sense that it involves “framing” to rigidify the bundles and then systematically extracting enough linear algebraic data to embed the moduli functor of framed bundles into a Grassmannian. The construction is also somewhat unusual in that the underlying varieties are not assumed to be quasiprojective, so one cannot necessarily obtain the desired data by resolving by sums of line bundles or twisting by an ample line bundle to produce sections. Instead, we use the torus action. As applications of this construction, one can show that the moduli of framed rank two toric vector bundles is always smooth, while the moduli of rank three toric vector bundles has very bad singularities (satisfies Murphy’s Law in the sense of Vakil).

Tid och plats: Torsdagen den 22 mars kl. 11.00–12.00 vid Institut Mittag-Leffler, Auravägen 17, Djursholm.

MITTAG-LEFFLER SEMINAR

Marco Manetti:

A deformation theoretic interpretation of Bloch's semiregularity map

Abstract: Using the formalism of extended deformations and differential graded Lie algebras, we are able to give a precise statement and a rigorous proof of the (hoped and expected) fact that the semiregularity map for a submanifold corresponds to a morphism between two deformation theories. As a trivial consequence of this fact we show that, in the Kaehler case, the semiregularity map annihilates every obstruction to embedded deformations.

Tid och plats: Torsdagen den 15 mars kl. 11.00–12.00 vid Institut Mittag-Leffler, Auravägen 17, Djursholm.

LICENTIATSEMINARIUM I DATALOGI

Daniel Aarno

presenterar sin licentiatavhandling:

Intention Recognition in Human Machine Collaborative Systems

Opponent: Associate Professor Darius Burschka, Technische Universität München.

Abstract: Robot systems have been used extensively during the last decades to provide automation solutions in a number of areas. The majority of the currently deployed automation systems are limited in that the tasks they can solve are required to be repetitive and predictable. One reason for this is the inability of today's robot systems to understand and reason about the world. Therefore the robotics and artificial intelligence research communities have made significant research efforts to produce more intelligent machines. Although significant progress has been made towards achieving robots that can interact in a human environment, there is currently no system that comes close to achieving the reasoning capabilities of humans.

In order to reduce the complexity of the problem, some researchers have proposed an alternative to creating fully autonomous robots capable of operating in human environments. The proposed alternative is to allow fusion of human and machine capabilities. For example, using teleoperation a human can operate at a remote site, which may not be accessible for the operator for a number of reasons, by issuing commands to a remote agent that will act as an extension of the operator's body.

Segmentation and recognition of operator generated motions can be used to provide appropriate assistance during task execution in teleoperative and human-machine collaborative settings. The assistance is usually provided in a virtual fixture framework, where the level of compliance can be altered online in order to improve the performance in terms of execution time and overall precision. Acquiring, representing and modeling human skills are key research areas in teleoperation, programming — by demonstration and human-machine collaborative settings. One of the common approaches is to divide the task that the operator is executing into several sub-tasks in order to provide manageable modeling.

This thesis is focused on two aspects of human-machine collaborative systems. Classification of an operator's motion into a predefined state of a manipulation task and assistance during a manipulation task based on virtual fixtures. The particular applications considered consist of manipulation tasks, where a human operator controls a robotic manipulator in a cooperative or teleoperative mode.

(Continued on the next page.)

A method for online task tracking using adaptive virtual fixtures is presented. Rather than executing a predefined plan, the operator has the ability to avoid unforeseen obstacles and deviate from the model. To allow this, the probability of following a certain trajectory sub-task is estimated and used to automatically adjust the compliance of a virtual fixture, thus providing an online decision of how to fixture the movement.

A layered hidden Markov model is used to model human skills. A gestic classifier that classifies the operator's motions into basic action-primitives, or gesticemes, is evaluated. The gestic classifiers are then used in a layered hidden Markov model to model a simulated teleoperated task. The classification performance is evaluated with respect to noise, number of gesticemes, type of the hidden Markov model and the available number of training sequences. The layered hidden Markov model is applied to data recorded during the execution of a trajectory-tracking task in two and three dimensions with a robotic manipulator in order to give qualitative as well as quantitative results for the proposed approach. The results indicate that the layered hidden Markov model is suitable for modeling teleoperative trajectory-tracking tasks and that the layered hidden Markov model is robust with respect to misclassifications in the underlying gestic classifiers.

Tid och plats: Fredagen den 23 mars kl. 10.00 i sal D31, KTH, Lindstedtsvägen 17, b.v.

GRADUATE STUDENT SEMINAR

Christian Lundkvist: The Grassmannian

Abstract: Let d and n be positive integers. The Grassmannian (or Grassmann variety) $G(d, n)$ is a classical moduli space which has been extensively studied in algebraic geometry. The points of the variety $G(d, n)$ parametrize d -dimensional linear subspaces of the projective space \mathbb{P}^n . I will discuss how to construct the Grassmannian using "Plücker coordinates" as the zero set of a system of quadratic polynomials in a large projective space \mathbb{P}^N .

If time permits I will also mention how to use Grassmann varieties to solve problems in enumerative geometry.

Tid och plats: Fredagen den 16 mars kl. 13.15–14.15 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

COMMON SU KOF/ KTH THEORETICAL PHYSICS SEMINAR

Subhash Chaturvedi:

Wigner distributions for qudits: Two approaches

Abstract: Two approaches to setting up Wigner distributions for finite state quantum systems are outlined. While the first is group theoretic in nature and works for all finite groups of odd order (abelian as well as non-abelian), the second, inspired by Dirac's work on functions of non-commuting observables, entails finding a specific square root of a certain Hadamard matrix and works in all dimensions.

Tid och plats: Onsdagen den 21 mars kl. 11.00 i sal FA31, Roslagstullsbacken 21, Alba-Nova universitetscentrum.

MITTAG-LEFFLER SEMINAR

**Timothy Logvinenko:
Non-commutative crepant resolutions
and the arising moduli constructions**

Abstract: In this talk we give an account of the following work by Michel van den Bergh: given a Gorenstein singularity $\text{Spec } R$, a certain class of non-commutative algebras are defined which are called the non-commutative crepant resolutions of $\text{Spec } R$. Then it is shown that given one such non-commutative crepant resolution A we can then construct ordinary, commutative crepant resolutions of $\text{Spec } R$ as fine moduli spaces of stable representations of A with a fixed dimension vector.

Tid och plats: Tisdagen den 20 mars kl. 14.00–15.00 vid Institut Mittag-Leffler, Aura-vägen 17, Djursholm.

MITTAG-LEFFLER SEMINAR

**Elena Kreines:
Generalized Grothendieck dessins d'enfants
and compactifications of moduli spaces**

Abstract: Grothendieck dessins d'enfants are connected embedded graphs of certain special structure on smooth oriented compact surfaces without boundary. It is known that there is a cell decomposition of the decorated moduli space of algebraic curves of genus g with n marked and numbered points such that each cell is marked by a dessin d'enfant. We are going to give an introduction to dessin d'enfants theory. Then we provide and investigate a compactification of the moduli space for which a cell decomposition related with dessins d'enfants can be prolonged to the boundary. In this compactification achieving the boundary corresponds to contracting an edge of the dessin. In this case, dessins on unions of surfaces (generalized dessins) should be considered.

Tid och plats: Torsdagen den 22 mars kl. 14.00–15.00 vid Institut Mittag-Leffler, Aura-vägen 17, Djursholm.

MITTAG-LEFFLER SEMINAR

**Orsola Tommasi:
Discriminants and cohomology of moduli spaces of curves**

Abstract: Let us consider the moduli space of non-singular projective complex curves of genus g with n marked points. The cohomology of such spaces is known only in cases where either the genus or the number of marked points is small. In this talk, we will present an approach to the computation of the rational cohomology that works well in such situations. It is based on a topological method (by Vassiliev and Gorinov) for the computation of the cohomology of complements of discriminants. Then, we will apply the method to the computation of the rational cohomology of moduli spaces of hyperelliptic curves of given genus with a small number of marked points.

Tid och plats: Torsdagen den 22 mars kl. 15.30–16.30 vid Institut Mittag-Leffler, Aura-vägen 17, Djursholm.

KOMBINATORIKSEMINARIUM

Christian Krattenthaler:

Growth diagrams, and increasing and decreasing chains in fillings of cell diagrams

Abstract: Recently, there has been a series of papers on the number of fillings of cell diagrams with restrictions on their increasing and decreasing chains, most notably the paper by Chen, Deng, Du, Stanley and Yan on matchings and set partitions with restrictions on their “crossings” and “nestings”, the paper by Bousquet-Mélou and Steingrímsson on involutions with restrictions on their increasing subsequences, and the paper by Jonsson on fillings of “moon polyominoes” with restrictions on their increasing chains. In this talk I shall outline that a unifying way to approach these problems is by the diagrammatic versions of the Robinson-Schensted algorithm (due to Fomin) and of Schützenberger’s jeu de taquin (due to van Leeuwen). This covers work by Martin Rubey and work by myself.

Tid och plats: Fredagen den 23 mars kl. 10.15 i sal D32, KTH, Lindstedtsvägen 5, b.v.

Stockholms universitet söker en forskarassistent i matematisk statistik

Tjänsten är placerad vid Matematiska institutionen

Arbetsuppgifterna består av egen forskning och viss undervisning. Anställningen får normalt innehåsa under fyra år.

Behörig att anställas som forskarassistent är den som har avlagt doktorsexamen eller har en utländsk examen som bedöms motsvara doktorsexamen. Examen skall vara avlagd vid ansökningstidens utgång. I första hand bör den komma i fråga som avlagt examen högst fem år före ansökningstidens utgång. Även den som har avlagt examen tidigare bör komma i fråga i första hand om det finns särskilda skäl. Med särskilda skäl avses ledighet på grund av sjukdom, tjänstgöring inom totalförsvaret, förtroendeuppdrag inom fackliga organisationer och studentorganisationer eller föräldraledighet eller andra liknande omständigheter. Den sökande skall ha såväl förmåga att samarbeta som den förmåga och lämplighet i övrigt som behövs för att fullgöra arbetsuppgifterna väl.

Vid tillsättningen kommer särskild vikt att fästas vid vetenskaplig skicklighet. Viss vikt fästs även vid pedagogisk skicklighet.

Kvinnliga sökande välkomnas, då flertalet forskarassistenter inom den matematisk-fysiska sektionen är män.

Ansökan skrivs på engelska och skall innehålla: meritförteckning inklusive publikationsförteckning, redogörelse (högst fem sidor) över den sökandes erfarenhet av forskning, undervisning inom grund- och forskarutbildning, administration, information om forsknings- och utvecklingsarbete och samverkan med det omgivande samhället, forskningsplan (1–2 sidor), kopior av betyg och examensbevis, samt två exemplar av åberopade vetenskapliga arbeten (högst 10 titlar).

Den sökande rekommenderas ta del av *Dokumentation av meriter för anställning som lärare vid Stockholms universitet*, se <http://www.su.se/nyanstallning>.

Upplysningar om anställningen lämnas av professor Tom Britton, e-post tomb@math.su.se, telefon 08-16 45 34. Frågor om ansökningsförfarandet kan ställas till handläggaren, Ann-Charlotte Östblom, e-post ac.ostblom@natkan.su.se, telefon 08-16 20 86.

Ansökan skickas till Stockholms universitet, Registrator/PÄ, 106 91 Stockholm, och skall ha inkommit senast måndagen den 16 april 2007. Ange ref.-nr SU 614-0565-07 i ansökan.

DISPUTATION I MATEMATIK

Jonas Sjöstrand

disputerar på avhandlingen

Enumerative combinatorics related to partition shapes

fredagen den 23 mars 2007 kl. 13.15 i sal F3, KTH, Lindstedtsvägen 26, b.v. Till opponent har utsetts *professor Christian Krattenthaler*, Universität Wien.

Abstract of the thesis

This thesis deals with enumerative combinatorics applied to three different objects related to partition shapes, namely tableaux, restricted words, and Bruhat intervals. The main scientific contributions are the following.

Paper I: Let the *sign* of a standard Young tableau be the sign of the permutation you get by reading it row by row from left to right, like a book. A conjecture by Richard Stanley says that the sum of the signs of all SYTs with n squares is $2^{\lfloor n/2 \rfloor}$. We prove a generalisation of this conjecture using the Robinson-Schensted correspondence and a new concept called chess tableaux. The proof is built on a remarkably simple relation between the sign of a permutation π and the signs of its RS-corresponding tableaux P and Q , namely $\text{sgn } \pi = (-1)^v \text{sgn } P \text{sgn } Q$, where v is the number of disjoint vertical dominoes that fit in the partition shape of P and Q .

The *sign-imbalance* of a partition shape is defined as the sum of the signs of all standard Young tableaux of that shape. As a further application of the sign-transferring formula above, we also prove a sharpening of another conjecture by Stanley concerning weighted sums of squares of sign-imbalance.

Paper II: We generalise some of the results in paper I to skew tableaux. More precisely, we examine how the sign property is transferred by the skew Robinson-Schensted correspondence invented by Sagan and Stanley. The result is a surprisingly simple generalisation of the ordinary non-skew formula above.

As an application, we find vanishing weighted sums of squares of sign-imbalance, thereby generalising a variant of Stanley's second conjecture.

Paper III: The following special case of a conjecture by Loehr and Warrington was proved by Ekhad, Vatter, and Zeilberger:

There are 10^n zero-sum words of length $5n$ in the alphabet $\{+3, -2\}$ such that no consecutive subword begins with $+3$, ends with -2 , and sums to -2 .

We give a simple bijective proof of the conjecture in its original and more general setting where 3 and 2 are replaced by any relatively prime positive integers a and b , 10^n is replaced by $\binom{a+b}{a}^n$, and $5n$ is replaced by $(a+b)n$. To do this we reformulate the problem in terms of cylindrical lattice walks which can be interpreted as the south-east border of certain partition shapes.

Paper IV: We characterise the permutations π such that the elements in the closed lower Bruhat interval $[\text{id}, \pi]$ of the symmetric group correspond to non-capturing rook configurations on a skew Ferrers board. These intervals turn out to be exactly those whose flag manifolds are *defined by inclusions*, as defined by Gasharov and Reiner.

The characterisation connects Poincaré polynomials (rank-generating functions) of Bruhat intervals with q -rook polynomials, and we are able to compute the Poincaré polynomial of some particularly interesting intervals in the finite Weyl groups A_n and B_n . The expressions involve q -Stirling numbers of the second kind, and for the group A_n putting $q = 1$ yields the poly-Bernoulli numbers defined by Kaneko.