BRÅKET

Information om seminarier och högre undervisning i matematiska ämnen i Stockholmsområdet

NR 18 **FREDAGEN DEN 9 MAJ 2008**

BRÅKET

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

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

Mini-symposium on Toric Geometry

Detta äger rum vid KTH måndagen den 12 maj. Se sidorna 6 – 7.

CIAM/DNA mini-workshop on Computational Number Theory

Denna äger rum vid KTH den 15 maj. Se Bråket nr 17 sidan 9.

Money, jobs: Se sidorna 14 – 15.

SEMINARIER

Seminarielistan börjar på sidan 2.

Disputation i datalogi

Jakob Nordström disputerar på avhandlingen *Short Proofs May Be Spacious: Understanding Space in Resolution* fredagen den 9 maj kl. 10.00 i sal D3, KTH, Lindstedtsvägen 5, b.v. Se Bråket nr 17 sidorna 6 – 7.

Disputation i statistik

Ellinor Fackle Fornius disputerar på avhandlingen *Optimal Design of Experiments for the Quadratic Logistic Model* fredagen den 9 maj kl. 10.00 i hörsal 4, hus B, SU, Universitetsvägen 10, Frescati. Se Bråket nr 16 sidan 6.

Disputation i statistik

Daniel Bruce disputerar på avhandlingen *Optimal Design and Inference for Correlated Bernoulli Variables using a Simplified Cox Model* fredagen den 16 maj kl. 10.00 i hörsal 3, hus B, SU, Universitetsvägen 10, Frescati. Se Bråket nr 17 sidan 8.

Disputation i numerisk analys

Mohammad Motamed disputerar vid KTH på avhandlingen *Topics in Analysis and Computation of Linear Wave Propagation* tisdagen den 20 maj kl. 10.15. Se sidan 12.

Festive Combinatorics

En konferens med denna titel skall äga rum vid KTH den 28 – 30 maj. Se sidan 14.

Integral Geometry and Tomography

En konferens med denna titel skall äga rum vid SU den 12 – 15 augusti. Se sidorna 13 – 14.

SEMINARIER

Fr 05–09 kl. 11.00–12.00. Optimization and Systems Theory Seminar. Professor Augusto Ferrante, Università di Padova: *Multivariate spectrum approximation in the Hellinger distance.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 16 sidan 5.

Fr 05–09 kl. 13.15–14.15. Graduate Student Seminar. Anders Karlsson, Matematik, KTH: *On the work of the 2008 Abel Laureates Thompson and Tits.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 17 sidan 9.

Må 05–12 kl. 15.15–16.00. Seminarium i finansiell matematik. Alexander Ruben presenterar sitt examensarbete: *Long-term simulation of yield curves and the computation of Potential Future Exposure for counterparty risk measurements.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 5.

Må 05–12 kl. 16.15–17.00. Seminarium i finansiell matematik. Mattias Larsson presenterar sitt examensarbete: *Portfolio optimization with Structured Products using Extreme Value Theory.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 8.

Ti 05–13 kl. 14.00–15.00. Mittag-Leffler Seminar — Plurikomplexa seminariet. Dan Coman, Syracuse University: *Stable algebras of entire functions.* Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 5.

Ti 05–13 kl. 15.30–16.30. Mittag-Leffler Seminar — Plurikomplexa seminariet. Tetseo Ueda, Kyoto University: *Critically finite maps on projective spaces.* Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 5.

Fortsättning på nästa sida.

PERSPECTIVES IN ANALYSIS, GEOMETRY, AND TOPOLOGY

A Marcus Wallenberg Symposium
on the occasion of Oleg Viro's 60th birthday,
Aula Magna, Stockholm University, May 19–25, 2008

The encounters between the fields of analysis, geometry and topology are widespread and often provide major impetus for breakthroughs in these domains. Impressive examples include the exciting new developments in low-dimensional topology related to invariants of links and three and four manifolds; Perelman's spectacular proof of the Poincaré conjecture; and also the recent advances made in algebraic, complex, symplectic and tropical geometry.

This conference invites distinguished speakers representing major directions in analysis, geometry and topology who, through their work, have contributed to establishing relations between these fields.

It also provides a pleasant opportunity to express admiration for the work and mathematical interests of Oleg Viro who will be celebrating his 60th birthday this year. Oleg Viro has made invaluable contributions to Swedish research by complementing the country's long-standing strong tradition of analysis with his own renowned expertise in topology and areas of geometry: subjects not previously widely studied in Sweden.

For more information, see the web page http://www2.math.su.se/pagt/. A detailed program of the conference will be given in the next issue of Bråket.

Seminarier (fortsättning)

On 05–14 kl. 10.30. Logikseminariet Stockholm-Uppsala. Olov Wilander: *Setoids and universes.* Sal 64119, Ångströmlaboratoriet, Uppsala universitet. Se sidan 15.

On 05–14 kl. 11.00 – 12.00. KTH/Nordita/SU Seminar in Theoretical Physics. Volker Schomerus, Hamburg: *Strings in holographic backgrounds.* Sal FA32, Roslagstullsbacken 21, AlbaNova universitetscentrum. Se sidan 7.

On 05–14 kl. 13.00. Licentiatseminarium i datalogi. John Ardelius presenterar sin licentiatavhandling: *On State Space Structure and Average Case Complexity.* Opponent: **Professor Bart Selman,** Cornell University, USA. Rum 132:028, Roslagstullsbacken 23, AlbaNova universitetscentrum.

On 05–14 kl. 13.15 – 14.15. Seminarium i analys och dynamiska system. Andreas Axelsson, SU: *A new approach to solvability of some elliptic PDEs with square integrable boundary data.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 8.

On 05–14 kl. 13.15 – 15.00. Algebra and Geometry Seminar. Andreas L. Knutsen, Bergen: *Families of rational curves in* Hilb^2 *of a surface.* Rum 306, hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 7.

On 05–14 kl. 16.00. KTH/SU Mathematics Colloquium. Nalini Anantharaman, Centre de Mathématiques Laurent Schwartz, École Polytechnique, Palaiseau, Frankrike: *Entropy and localization of eigenfunctions.* 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 9.

To 05–15 kl. 10.30. Seminar in Fluid Mechanics. K. Breuer: *The mechanics of microscale flagellar motion.* Seminarierummet, Institutionen för mekanik, KTH, Teknikringen 8. Se sidan 13.

To 05–15 kl. 14.00 – 14.50. CIAM/DNA mini-workshop on Computational Number Theory. Hans Riesel, Nada, KTH: *Primtalssökning förr. Historik över och utveckling av primtalssökning före datorerna.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 17 sidan 9.

To 05–15 kl. 15.00 – 15.50. CIAM/DNA mini-workshop on Computational Number Theory. Niels Möller, Reglerteknik, KTH: *Subquadratic GCD.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 17 sidan 9.

To 05–15 kl. 15.15 – 16.15. AlbaNova and Nordita Colloquium in Physics. Professor Mischa Bonn, FOM-Institute for Atomic and Molecular Physics, Amsterdam: *Water at biological membranes: structure, dynamics and biomolecular sensing.* Oskar Kleins auditorium, Roslagstullsbacken 21, AlbaNova universitetscentrum. Se sidan 10.

To 05–15 kl. 15.30 – 16.30. Mittag-Leffler Seminar. Steve Zelditch, Johns Hopkins University: *Geodesics and harmonic maps in spaces of Kähler metrics on a toric variety.* Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 9.

To 05–15 kl. 16.10 – 17.00. CIAM/DNA mini-workshop on Computational Number Theory. Torbjörn Granlund, Teoretisk datalogi, KTH: *GMP — current and future algorithms and tricks.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 17 sidan 9.

Fortsättning på nästa sida.

Seminarier (fortsättning)

Fr 05–16 kl. 11.00–12.00. Optimization and Systems Theory Seminar. Stefan Almér, Optimeringslära och systemteori, KTH: *Control and Analysis of Pulse-Modulated Systems.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

Fr 05–16 kl. 13.15–14.15. DNA-seminariet Uppsala-KTH (Dynamical systems, Number theory, Analysis). Nalini Anantharaman, Centre de Mathématiques Laurent Schwartz, École Polytechnique, Palaiseau, Frankrike: *Entropy and localization of eigenfunctions.* Sal D33, KTH, Lindstedtsvägen 5, b.v. Se sidan 13.

Fr 05–16 kl. 13.15–14.15. Graduate Student Seminar. Michael Björklund, Matematik, KTH: *Title to be announced.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

Må 05–19 kl. 13.15. Seminarium i numerisk analys. *(Observera dagen och tiden!)* **Professor Shi Jin,** Department of Mathematics, University of Wisconsin, USA: *Coherent semiclassical transport models for thin quantum barriers.* Rum 1537, KTH CSC, Lindstedtsvägen 3, plan 5. Se sidan 8.

Professor Jin är opponent vid Mohammad Motameds disputation. Se sidan 12.

On 05–21 kl. 11.00–12.00. KTH/Nordita/SU Seminar in Theoretical Physics. Hans Fogedby, Köpenhamn: *Aspects of nonequilibrium: Growth and pattern formation in the Kardar-Parisi-Zhang equation for a growing interface.* Sal FA31, Roslagstullsbacken 21, AlbaNova universitetscentrum. Se sidan 9.

On 05–21 kl. 13.15–14.15. Seminarium i analys och dynamiska system. Yacin Ameur, KTH: *Title to be announced.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

On 05–21 kl. 15.15. Seminarium i numerisk analys. Florian Beyer, Matematik, KTH: *A numerical study of the strong cosmic censorship conjecture in general relativity.* Rum 4523, KTH CSC, Lindstedtsvägen 5, plan 5. Se sidan 11.

On 05–21 kl. 16.00. KTH/SU Mathematics Colloquium. Steve Zelditch, Johns Hopkins University: *Nodal lines, ergodicity and complex numbers.* 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 11.

To 05–22 kl. 10.30. Seminar in Fluid Mechanics. Gilead Tadmor, Mathematics Department, Northeastern University: *A unified framework for low order Galerkin flow models and feedback flow control.* Seminarierummet, Institutionen för mekanik, KTH, Teknikringen 8. Se sidan 10.

To 05–22 kl. 13.15–14.15. Minicourse in Mathematics. Martin Gulbrandsen: *Local aspects of geometric invariant theory. Second lecture.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 17 sidan 10.

Ingen undervisning i Martin Gulbrandsens kurs ges torsdagen den 15 maj.

Fr 05–23 kl. 13.15–14.15. Graduate Student Seminar. Martin Bender, Matematik, KTH: *Title to be announced.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

SEMINARIUM I FINANSIELL MATEMATIK

Alexander Ruben

presenterar sitt examensarbete:

Long-term simulation of yield curves and the computation of Potential Future Exposure for counterparty risk measurements

Abstract: The Basel II framework introduced new methods for the calculation of counterparty credit risk for OTC-derivatives. One of these methods is the Internal Model Method, which may use a simulation based approach in order to quantify counterparty exposures in terms of Potential Future Exposure and Exposure at Default. In this thesis we use sophisticated term-structure models for the estimation of counterparty exposures for horizons reaching beyond ten years. The exposures we will focus on are driven by the interest rate as a risk factor, which is why we specifically will look at long-term simulations of the yield curve. We will define what requirements an interest-rate model must fulfil in order to be considered for Basel II use, furthermore we will investigate the Hull-White model, the G2++ model and the Libor Market Model for our purpose of quantifying future counterparty exposures. Regarding these models we will look at calibration issues and simulations of zero-coupon bond prices and yield curves in order to conclude what model to use for our purpose.

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

MITTAG-LEFFLER SEMINAR — PLURIKOMPLEXA SEMINARIET

Dan Coman:
Stable algebras of entire functions

Abstract: Two entire functions f and g on $\mathbb{C}^n$ are algebraically dependent over $\mathbb{C}$ if there is a non-zero polynomial P in $\mathbb{C}[x, y]$ such that $P(f, g) = 0$. Such pairs are easy to describe.

The problem of characterizing when entire functions f, g are algebraically dependent over the ring $\mathcal{P}^n$ of polynomials on $\mathbb{C}^n$ seems difficult. The simple dependence relation $P(f, g) = P_1(f)g + P_0(f) = 0,\ P_1, P_0 \in \mathcal{P}^n[x]$, leads to the question of when the ratio $P_0(f)/P_1(f)$ is entire. We consider this question in the second half of this talk.

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

MITTAG-LEFFLER SEMINAR — PLURIKOMPLEXA SEMINARIET

Tetseo Ueda:
Critically finite maps on projective spaces

Abstract: We will discuss holomorphic maps of a projective space P^n onto itself, focusing on the class of (strictly) critically finite maps. For such maps we show the following:

(1) All periodic points are repelling, and they are dense in P^n.

(2) If K is a compact connected set in P^n containing at least one point, then no subsequence of the iterates of f is uniformly convergent on K.

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

MINI-SYMPOSIUM ON TORIC GEOMETRY

The mini-symposium will take place on Monday, May 12, in seminar room 3721, Department of Mathematics, KTH, Lindstedtsvägen 25, floor 7.

As final work requirement for the course SF2716, Toric Geometry, some of the Ph.D. students attending the course for credit will give talks on several applications of toric geometry. The talks are intended for a general audience. It is a great opportunity to hear about how toric geometry has proven to be important in Numerical Analysis, Statistics, Coding Theory, and Algebraic Geometry.

Everyone is very welcome!

If you have any questions, contact Sandra Di Rocco (e-mail: dirocco@math.kth.se).

Schedule

10.00 – 10.30 **David Eklund:** *The BKK-theorem.*
Abstract: Let $f_1, \dots, f_n$ be Laurent polynomials in n variables with complex coefficients, and let $P_1, \dots, P_n$ be the corresponding Newton polytopes. The BKK-theorem (Bernstein, Kushnirenko, Khovanski) says that the number of isolated solutions of the system $f_1 = \cdots = f_n = 0$ in $(\mathbb{C} \setminus \{0\})^n$ is bounded from above by the mixed volume of $P_1, \dots, P_n$. I will sketch a proof of this theorem using toric geometry.

10.45 – 11.15 **Michael Björklund:** *The beginning of algebraic statistics.*
Abstract: I will discuss the pioneering works of P. Diaconis and B. Sturmfels on what has become known as algebraic statistics. Toric geometry is used to understand a certain polytope of finite measures supported on a given finite set. This analysis is complemented by techniques from Markov theory and Gröbner bases.

11.30 – 12.00 **Kathrin Vorwerk:** *A glimpse of phylogenetic algebraic geometry.*
Abstract: Starting with a finite tree T, statistical models of evolution can be interpreted as certain complex projective algebraic varieties X_T. Phylogenetic algebraic geometry means the study of those varieties. Considering the in biology well-known Jukes-Cantor model, one ends up with a toric variety. Recent results on this variety include (i) the determination of the Gröbner basis of the corresponding toric ideal, and (ii) the surprising fact that the Erhart polynomial of the corresponding polytope depends on the size of the tree T but not on its shape.

12.00 – 13.15 Lunch break.

13.15 – 13.45 **Thomas Westerbäck:** *Toric codes.*
Abstract: Toric codes are a class of linear codes that were introduced by Johan P. Hansen in the end of the 1990's. The toric codes in Hansen's construction are explicitly constructed from integral convex polytopes $P \subseteq \mathbb{R}^2$. For any P there is a unique corresponding error-correcting code of length $(q-1)^2$ over the finite field $GF(q)$. The code is obtained by evaluation of rational functions on a toric surface associated to the given polytope P. The dimension of the code is equal to the number of integral points in P.

(Continued on the next page.)

14.00 – 14.30 **Mehdi Tavakol:** *Equations for Chow and Hilbert quotients.*

Abstract: There are several ways to describe the moduli space $\overline{\mathcal{M}}_{0,n}$ of n-pointed stable curves of genus zero. Keel describes the moduli space via a composition of smooth codimension two blowups, which can be used to determine the Chow ring. Kapranov has shown that $\overline{\mathcal{M}}_{0,n}$ is isomorphic to both the Chow and Hilbert quotients of $G(2,n)$ by the T^{n-1} action. There is another description of $\overline{\mathcal{M}}_{0,n}$ as a subvariety of a smooth toric variety X_Δ whose fan is the space of phylogenetic trees. With this approach we will be able to see that the equations for $\overline{\mathcal{M}}_{0,n}$ in the Cox ring S of X_Δ are generated by the Plücker relations homogenized with respect to the grading of S.

KTH/NORDITA/SU SEMINAR IN THEORETICAL PHYSICS

Volker Schomerus:
Strings in holographic backgrounds

Abstract: According to the so-called AdS/CFT correspondence, many interesting four-dimensional gauge theories possess an equivalent description through closed strings. In order for this duality to work, however, the strings must propagate in novel five-dimensional "holographic" backgrounds. After reviewing key ideas and features of gauge-string dualities, I shall extract a list of new challenges that are posed to perturbative string theory. Their formulation highlights interesting links with a variety of current problems in mathematical physics, disordered electron systems, and surface critical phenomena. The talk concludes with some promising recent developments that are being pursued to construct string theory in holographic backgrounds.

Tid och plats: Onsdagen den 14 maj kl. 11.00 – 12.00 i sal FA32, Roslagstullsbacken 21, AlbaNova universitetscentrum.

ALGEBRA AND GEOMETRY SEMINAR

Andreas L. Knutsen:
Families of rational curves in Hilb^2 **of a surface**

Abstract: Let S be a smooth projective surface and $\mathrm{Hilb}^k(S)$ the Hilbert scheme parametrizing 0-dimensional subschemes of length k on S. Irreducible rational curves on S with a g^1_k on their normalizations give rise to irreducible rational curves in $\mathrm{Hilb}^k(S)$. In the case where S is a K3 surface, $\mathrm{Hilb}^k(S)$ is one of the few examples known of a symplectic (or hyperkähler) manifold, and rational curves therein are of interest in particular because they determine the ample and nef cone of $\mathrm{Hilb}^k(S)$: a line bundle L on $\mathrm{Hilb}^k(S)$ is ample (resp. nef) if and only if $L.R > 0$ (resp. ≥ 0) for all irreducible rational curves R in $\mathrm{Hilb}^k(S)$.

The talk will focus on the case $k = 2$. I will give results bounding the dimension of such families on surfaces in general, and then consider the case of K3 surfaces, where I will give concrete examples and both existence and nonexistence results of different classes of rational curves.

Tid och plats: Onsdagen den 14 maj kl. 13.15 – 15.00 i rum 306, hus 6, Matematiska institutionen, SU, Kräftriket.

SEMINARIUM I FINANSIELL MATEMATIK

Mattias Larsson

presenterar sitt examensarbete:

Portfolio optimization with Structured Products using Extreme Value Theory

Abstract: The purpose of this thesis is to show how portfolio optimization can be performed with structured products using extreme value theory and copulas. The margins of the financial time series are modelled individually using time series analysis and extreme value theory. The dependency structure is tailored using copulas. Portfolio optimization is performed using scenario generation and CVaR minimization.

Tid och plats: Måndagen den 12 maj kl. 16.15 – 17.00 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

SEMINARIUM I ANALYS OCH DYNAMISKA SYSTEM

Andreas Axelsson:
A new approach to solvability of some elliptic PDEs with square integrable boundary data

Abstract: I will survey recent progress in the study of second order elliptic divergence form equations with complex measurable coefficients A. The main result is that the set of $A \in L_\infty(\mathbb{R}^n; \mathbb{C}^{n+1})$ for which boundary value problems with L_2 Dirichlet or Neumann data are well-posed, is an open set. Furthermore we prove that these boundary value problems are well-posed when A is either Hermitean, block or constant.

This is joint work with P. Auscher and A. McIntosh.

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

SEMINARIUM I NUMERISK ANALYS

Shi Jin:
Coherent semiclassical transport models for thin quantum barriers

Abstract: We present time-dependent semiclassical transport models for mixed state scattering with thin quantum barriers. The idea is to use a multiscale approach to connect regions for which a classical description of the system dynamics is valid across regions for which the classical description fails, such as when the gradient of the potential is undefined. We do this by first solving a stationary Schrödinger equation in the quantum region to obtain the scattering coefficients. These coefficients allow us to build the interface condition to the particle flux that bridges the quantum region, connecting two classical regions. Away from the barrier, the problem may be solved by traditional numerical methods. The overall numerical cost is roughly the same as solving a classical barrier.

By using quantum scattering data and complex Liouville equations we are even able to handle wave inteferences across the barrier.

This is a joint work with Kyle Novak.

Tid och plats: Måndagen den 19 maj kl. 13.15 i rum 1537, KTH CSC, Lindstedtsvägen 3, plan 5.

KTH/SU MATHEMATICS COLLOQUIUM

Nalini Anantharaman:
Entropy and localization of eigenfunctions

Abstract: On a compact negatively curved manifold, we study the asymptotic behaviour of the eigenfunctions (ϕ_n) of the laplacian, when the eigenvalue λ_n goes to infinity. The Quantum Unique Ergodicity conjecture says that the probability measures $|\phi_n(x)|^2 dx$ should converge weakly to the riemannian volume (the uniform measure). We prove a result going in this direction, saying that the 'dynamical' entropy of these measures is asymptotically positive.

The colloquium talk will be an introduction to the subject. In a follow-up talk in the DNA Seminar more details about the proof and recent developments will be given.

Tid och plats: Onsdagen den 14 maj 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.

MITTAG-LEFFLER SEMINAR

Steve Zelditch:
Geodesics and harmonic maps in spaces of Kähler metrics on a toric variety

Abstract: The space $H(\omega)$ of Kähler metrics in a fixed Kähler class ω on any Kähler manifold (M, ω) is formally an infinite-dimensional symmetric space. Its geodesics are solutions of a homogeneous Monge-Ampère equation. When ω is integral, the individual metrics of $H(\omega)$ can be very well approximated by a polynomial like 'Bergman metrics' in a finite-dimensional symmetric space $H_N(\omega)$.

This suggests that the geometry of $H_N(\omega)$ should tend to the geometry of $H(\omega)$, and in particular that geodesics of $H_N(\omega)$ should tend to those of $H(\omega)$. This was proved in a weak sense by Phong-Sturm (-Berndtsson).

My talk reports on joint work with J. Song and Y. Rubinstein, which proves stronger results on the approximation of geodesics, test configuration geodesic rays.

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

KTH/NORDITA/SU SEMINAR IN THEORETICAL PHYSICS

Hans Fogedby:
Aspects of nonequilibrium: Growth and pattern formation in the Kardar-Parisi-Zhang equation for a growing interface

Abstract: A nonperturbative weak noise scheme is applied to the Kardar-Parisi-Zhang equation for a growing interface in all dimensions. It is shown that the growth morphology can be interpreted in terms of a dynamically evolving texture of localized growth modes with superimposed diffusive modes. Applying Derrick's theorem it is conjectured that the upper critical dimension is four.

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

ALBANOVA AND NORDITA COLLOQUIUM IN PHYSICS

Mischa Bonn:
Water at biological membranes:
structure, dynamics and biomolecular sensing

Abstract: Biological action requires water. For example, the interaction with water triggers the self-assembly of lipids into the membrane bilayer, which separates the inside of the cell from the outside. Moreover, the organization and functioning of proteins — the micromachines of life — that are embedded in membranes, depend on the structure and dynamics of water molecules at the membrane/water interface. Experimental studies of water in these environments are difficult because of the challenge of isolating the signal of interfacial water from that of the bulk. Here we report a series of surface specific studies of the membrane/water interface using surface-specific vibrational spectroscopies, both in equilibrium and on ultrafast (femtosecond) time scales. Our approach allows us to selectively investigate the one monolayer of water molecules at the membrane/water interface.

Water is characterized through its O-H stretch vibration. Static vibrational spectra reveal distinct peaks in the O-H stretch region, in contrast to the bulk vibrational spectrum. We can use changes in the amplitudes of these water peaks to detect picomolar concentrations of DNA, by its adsorption to the model membrane surface. Using femtosecond time-resolved VSFG, we probe the vibrational dynamics of interfacial water molecules. In contrast to water at a variety of other interfaces, membrane-bound water does not rapidly exchange vibrational energy with the underlying bulk. This observation illustrates that membrane-bound water is an inherent part of the membrane: water at the membrane interface does not just terminate the bulk.

Tid och plats: Torsdagen den 15 maj kl. 15.15 – 16.15 i Oskar Kleins auditorium, Roslagstullsbacken 21, AlbaNova universitetscentrum.

SEMINAR IN FLUID MECHANICS

Gilead Tadmor:
A unified framework for low order Galerkin flow models
and feedback flow control

Abstract: Reduced order Galerkin models are typically focused on a selected range of time and length scales that dominate coherent fluctuations. A truncated energy cascade and flow structure deformations often severely limit the predictive power of the model, especially when very low order models are used to design feedback controllers. We review a systematic modelling and design approach that addresses these issues, based on mean-field and finite time thermodynamics frameworks. We illustrate modelling and design problems by numerical and experimental examples.

The talk describes joint work with Bernd Noack, Michael Schlegel, Rudibert King, Mark Luchtenburg, Mark Pastoor, Oliver Lehmann, Gerd Mutschke, Marek Morzynski, and Boye Ahlborn.

Tid och plats: Torsdagen den 22 maj kl. 10.30 i seminarierummet, Institutionen för mekanik, KTH, Teknikringen 8.

SEMINARIUM I NUMERISK ANALYS

Florian Beyer:
A numerical study of the strong cosmic censorship conjecture in general relativity

Abstract: In the field of Einstein's general relativity, promising successes have been achieved. This is the case both for the understanding of the nature of the theory, and for qualitative and quantitative aspects, since the formulation of Einstein's field equations (EFE) as a Cauchy problem about 50 years ago. Nevertheless, there are several serious outstanding questions at the very heart of the theory. One of those issues is the following. In order to simplify the discussion, let us neglect all matter fields and restrict to 'pure gravity'. Suppose that — in a well-defined sense — one prescribes the 'state' of spacetime at some initial time, the initial data. Due to results by Choquet-Bruhet and others, there always exists a unique spacetime corresponding to these data in a local time neighbourhood of the initial time, which is a solution of EFE. Now, let us extend this spacetime in time as a solution of EFE such that the paths of all observers starting from the initial time are included completely. Is this extended spacetime always unique? The hope was that the answer is 'yes' because otherwise Einstein's theory would have only limited predictive power. However, certain counter-examples were found, one of them is the family of Taub-NUT solutions. Nevertheless, there are reasons to believe that all known examples of this kind are 'non-generic' in a certain sense, and the conjecture, called strong cosmic censorship conjecture, is that for 'generic' solutions, Einstein's theory retrieves its 'global' predictive power. Analytical and numerical attempts to shed light on such aspects have been undertaken since many years. Although one was able to prove the strong cosmic censorship conjecture only in certain symmetry classes so far, these studies have revealed interesting new insides.

After having introduced the necessary background and given some comments on the current state of knowledge on strong cosmic censorship, I will discuss some of my studies of non-linear perturbations of Taub-NUT spacetimes with my own numerical code based on spectral methods.

Tid och plats: Onsdagen den 21 maj kl. 15.15 i rum 4523, KTH CSC, Lindstedtsvägen 5, plan 5.

KTH/SU MATHEMATICS COLLOQUIUM

Steve Zelditch:
Nodal lines, ergodicity and complex numbers

Abstract: This talk is about nodal lines (zero sets) of eigenfunctions on real analytic Riemannian manifolds with ergodic geodesic flow. Since the time of Chladni, people have tried to describe the pattern of nodal lines in the high frequency (eigenvalue) limit. It is an intractable problem in the real domain, but it turns out to be tractable if one holomorphically extends eigenfunctions to the complexification of M. The holomorphic extension simplifies the problem, much as complex algebraic geometry is simpler than real algebraic geometry. The complex zero set has a limit formula for almost all eigenfunctions in the ergodic case.

Tid och plats: Onsdagen den 21 maj 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.

DISPUTATION I NUMERISK ANALYS

Mohammad Motamed

disputerar på avhandlingen

Topics in Analysis and Computation of Linear Wave Propagation

tisdagen den 20 maj 2008 kl. 10.15 i sal D2, KTH, Lindstedtsvägen 5, b.v. Till opponent har utsetts *professor Shi Jin,* Department of Mathematics, University of Wisconsin, USA.

Abstract of the thesis

This thesis concerns the analysis and numerical simulation of wave propagation problems described by systems of linear hyperbolic partial differential equations.

A major challenge in wave propagation problems is numerical simulation of high frequency waves. When the wavelength is very small compared to the overall size of the computational domain, we encounter a multiscale problem. Examples include the forward and the inverse seismic wave propagation, radiation and scattering problems in computational electromagnetics and underwater acoustics. In direct numerical simulations, the accuracy of the approximate solution is determined by the number of grid points or elements per wavelength. The computational cost to maintain constant accuracy grows algebraically with the frequency, and for sufficiently high frequency, direct numerical simulations are no longer feasible. Other numerical methods are therefore needed. Asymptotic methods, for instance, are good approximations for very high frequency waves. They are based on constructing asymptotic expansions of the solution. The accuracy increases with increasing frequency for a fixed computational cost. Most asymptotic techniques rely on geometrical optics equations with frequency independent unknowns. There are, however, two deficiencies in the geometrical optics solution. First, it does not include diffraction effects. Secondly, it breaks down at caustics. Geometrical theory of diffraction provides a technique for adding diffraction effects to the geometrical optics approximation by introducing diffracted rays. In papers 1 and 2 we present a numerical algorithm for computing an important type of diffracted rays known as creeping rays. Another asymptotic model which is valid also at caustics is based on Gaussian beams. In papers 3 and 4, we present an error analysis of Gaussian beams approximation and develop a new numerical algorithm for computing Gaussian beams, respectively.

Another challenge in computation of wave propagation problems arises when the system of equations consists of second order hyperbolic equations involving mixed space-time derivatives. Examples include the harmonic formulation of Einstein's equations and wave equations governing elasticity and acoustics. The classic computational treatment of such second order hyperbolic systems has been based on reducing the systems to first order differential forms. This treatment has, however, the disadvantage of introducing auxiliary variables with their associated constraints and boundary conditions. In paper 5, we treat the problem in the second order differential form, which has advantages for both computational efficiency and accuracy over the first order formulation.

Finally, paper 6 concerns the concept of well-posedness for a class of linear hyperbolic initial boundary value problems which are not boundary stable. The well-posedness is well established for boundary stable hyperbolic systems for which we can obtain sharp estimates of the solution including estimates at boundaries. There are, however, problems which are not boundary stable but are well-posed in a weaker sense, i.e., the problems for which an energy estimate can be obtained in the interior of the domain but not on the boundaries. We analyse a model problem of this type. Possible applications arise in elastic wave equations and Maxwell's equations describing glancing and surface waves.

SEMINAR IN FLUID MECHANICS

K. Breuer:
The mechanics of microscale flagellar motion

Abstract: Many biological systems are characterized by the motion of long, thin flexible filaments, which are used for propulsion by flagellated bacteria as well as for nutrient absorption, acoustic transduction, and countless other biological applications. Drawing from microscale and macroscale experiments as well as theoretical studies, we will discuss aspects of flagellar mechanics, including (i) the bundling of bacterial flagella as the cells move, (ii) the synchronization of multiple flagella due to hydrodynamic interactions, and (iii) the elastic instabilities of flagella due to viscous stresses.

Tid och plats: Torsdagen den 15 maj kl. 10.30 i seminarierummet, Institutionen för mekanik, KTH, Teknikringen 8.

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

Nalini Anantharaman:
Entropy and localization of eigenfunctions

Abstract: On a compact negatively curved manifold, we study the asymptotic behaviour of the eigenfunctions (ϕ_n) of the laplacian, when the eigenvalue λ_n goes to infinity. The Quantum Unique Ergodicity conjecture says that the probability measures $|\phi_n(x)|^2 dx$ should converge weakly to the riemannian volume (the uniform measure). We prove a result going in this direction, saying that the 'dynamical' entropy of these measures is asymptotically positive.

This is a follow-up talk to the colloquium and will give more details about the proof and recent developments.

Tid och plats: Fredagen den 16 maj kl. 13.15 – 14.15 i sal D33, KTH, Lindstedtsvägen 5, b.v.

INTEGRAL GEOMETRY AND TOMOGRAPHY

International Conference
dedicated to Jan Boman's 75th birthday,
Stockholm University, August 12 – 15, 2008

The main theme of the conference is integral geometry and its applications. The conference will bring together specialists in pure and applied aspects of the mathematics of tomography and related techniques.

Organizers: P. Kurasov, M. Passare, T. Quinto, J.-O. Strömberg, and O. Öktem.

Advisory board: J. Boman, F. Natterer, T. Quinto, and G. Uhlmann.

Invited speakers: Y. Colin de Verdière (Grenoble), L. Ehrenpreis (Temple), D. Finch (Corvallis), S. Gindikin (Rutgers), A. Greenleaf (Rochester), E. Grinberg (New Hampshire), M. de Hoop (Purdue), A. Katsevich (Kansas), P. Kuchment (Texas), F. Natterer (Münster), R. Novikov (Nantes), M. Lassas (Helsinki), A. Louis (Saarbrücken), A. Melin (Lund), L. Päivärinta (Helsinki), T. Quinto (Boston), V. Sharafutdinov (Novosibirsk), and G. Uhlmann (Seattle).

(Continued on the next page.)

If you want to participate, please register for the conference by sending an e-mail containing the following information to igt@math.su.se:

- Name,
- Affiliation,
- Period of stay.

There will be no conference fee, but the organizers reserve the right to charge for a contribution towards the conference dinner.

More information about the conference can be found at the conference web-page: http://www2.math.su.se/igt/.

P. Kurasov, M. Passare, H. Rullgård, J.-O. Strömberg, and O. Öktem

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FESTIVE COMBINATORICS

in honor of Anders Björner's 60th birthday, KTH, May 28 – 30, 2008

On December 17, 2007, Anders Björner turned 60. In honor of this event there will be a combinatorial gathering at KTH on May 28 – 30, 2008.

Speakers are collaborators and former students of Anders Björner:

Louis J. Billera, Francesco Brenti, Torsten Ekedahl, Henrik Eriksson, Dmitry Feichtner-Kozlov, Mark Goresky, Jakob Jonsson, Gil Kalai, Johan Karlander, László Lovász, Robert D. MacPherson, Jirí Matousek, Jürgen Richter-Gebert, Bruce E. Sagan, John Shareshian, Jonas Sjöstrand, Richard P. Stanley, Bernd Sturmfels, Michelle L. Wachs, Volkmar Welker, Johan Wästlund.

Conference homepage: http://www.math.kth.se/bjorner60/.

No registration is necessary, but those interested in participating in any of the social events must inform Axel Hultman, e-amil axel@math.kth.se, by May 13 at the latest. There will be three social events: City hall reception on Wednesday, conference dinner on Friday, and boat excursion on Saturday. For details and costs, see the conference homepage.

Welcome!

Organizers:
Kimmo Eriksson, Axel Hultman, Svante Linusson, and Günter Ziegler

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MONEY, JOBS

Columnist: Johannes Lundqvist, Department of Mathematics, Stockholm University. E-mail: johannes@math.su.se.

Info = information. This will be given and repeated until obsolete. Rely on other sources as well.
BBKTH = Bulletin Board at the Department of Mathematics, KTH.
BBSU = Bulletin Board at the Department of Mathematics, SU.
The following information, with links, is also available at http://www2.math.su.se/~johannes/mj.html.
Unless stated otherwise, a given date is the last date (e.g. for applications), and the year is 2008. A number without an explanation is a telephone number.

Standard information channels

1. A channel to information from Vetenskapsrådet: http://www.vr.se/naturteknik/index.asp.
2. A channel to information from the European Mathematical Society: http://www.emis.de.
3. A channel to information from the American Mathematical Society: http://www.ams.org.

(Continued on the next page.)

4. KTH site for information on funds: http://www.kth.se/aktuellt/stipendier.
5. Stockholm University site for information on funds: http://www2.su.se/forskning/stipendier/databas.php3.
6. Umeå site for information on funds: http://www.umu.se/umu/aktuellt/stipendier_fond_anslag.html.
7. Job announcement site: http://www.maths.lth.se/nordic/Euro-Math-Job.html. This is run by the European Mathematical Society.
8. Stiftelsen för internationalisering av högre utbildning och forskning (STINT) site for information on funds: http://www.stint.se.
9. Nordisk Forskerutdanningsakademi (NorFA) site for information on funds: http://www.norfa.no.
10. Svenska institutet (SI) site for information on funds: http://www.si.se.

New information

Jobs to apply for

11. Institutionen för matematik vid KTH utlyser två industridoktorandtjänster inom finansiell matematik till två projekt som kommer att drivas tillsammans med AB Svensk Exportkredit. Sista ansökningsdag är den 5 juni. Web-info: http://www.math.kth.se/IDannons.pdf.

Old information

Jobs to apply for

12. The Australian National University i Canberra söker en "Postdoctoral/Research Fellow in Mathematics". Tjänsten varar upp till två år och finansieras av "an ARC Discovery Project grant in Harmonic Analysis of Elliptic Systems on Riemannian Manifolds". Kandidater bör ha forskningserfarenhet av harmonisk analys och till viss del av operatorteori, partiella differentialekvationer och differentialgeometri. Sista ansökningsdag är den 16 maj. Web-info: http://info.anu.edu.au/hr/Jobs/Academic_Positions/_MSI4767.asp.
13. KTH söker doktorander i matematik. Sista ansökningsdag är den 16 maj. Web-info: http://www.math.kth.se/utlysning.tjanst/utlysn.dokt.080416.html.
14. Linköpings universitet söker en doktorand i matematik. Sista ansökningsdag är den 9 maj. Web-info: http://www.liu.se/jobbdb/show.html?2449.
15. Linköpings universitet söker en doktorand inom forskarskolan i tvärvetenskaplig matematik. Utbildningen vänder sig till studenter som har ett starkt intresse för matematik och som samtidigt är intresserade av att arbeta aktivt med problem med anknytning till ett tillämpat ämne. Aktuella avhandlingsprojekt finns beskrivna på http://www.mai.liu.se/tvarvetenskap/. Sista ansökningsdag är den 16 maj. Web-info: http://www.liu.se/jobbdb/show.html?2447.
16. Uppsala universitet söker två forskare i tillämpad matematik. Anställningen omfattar längst två år. Doktorsexamen i matematik eller annat ämne med stort matematiskt innehåll skall ha avlagts tidigast tre år före ansökningstillfället. Sista ansökningsdag är den 26 maj. Web-info: http://www.personalavd.uu.se/ledigaplatser/780forsk.html.
17. Göteborgs universitet söker en universitetslektor i matematisk statistik med inriktning mot statistisk inferens. Tjänsten är placerad vid Matematiska vetenskaper (samverkande med CTH). Sista ansökningsdag är den 22 maj. Web-info: http://www.math.chalmers.se/univlektormatematiskstatistik080228eng.pdf.
18. Chalmers tekniska högskola söker en professor i matematisk statistik. Sista ansökningsdag är den 22 maj. Web-info: http://www.math.chalmers.se/ProfMathStat4March08.pdf.

LOGIKSEMINARIET STOCKHOLM-UPPSALA

Olov Wilander: Setoids and universes

Abstract: Setoids commonly take the place of sets when formalizing mathematics inside type theory. In this talk, the category of setoids is studied in type theory with as small universes as possible (and thus, the type theory as weak as possible). Particularly, we will consider epimorphisms and disjoint sums.

Tid och plats: Onsdagen den 14 maj kl. 10.30 i sal 64119, Ångströmlaboratoriet, Uppsala universitet.
