BRÅKET

Information om seminarier och högre undervisning i matematiska ämnen i Stockholmsområdet

NR 17 **TORSDAGEN DEN 30 APRIL 2009**

BRÅKET

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

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Sista manustid för nästa nummer: Torsdagen den 7 maj kl. 13.00.

Disputation i matematik

Alexander Engström skall disputera på avhandlingen *Topological Combinatorics* fredagen den 8 maj kl. 13.00 i sal E2, KTH, Lindstedtsvägen 3, b.v. Se Bråket nr 16 sidan 3.

Money, jobs: Se sidorna 13 – 14.

SEMINARIER

To 04–30 kl. 11.15 – 12.15. Kombinatorikseminarium. *(Observera dagen, tiden och lokalen!)* **Brian Hopkins,** Saint Peter's College: *Bulgarian solitaire and related operations on partitions.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 15 sidan 6.

Må 05–04 kl. 13.15 – 14.00. Joint CIAM Seminar and ACCESS Distinguished Lecture. Professor Roger Brockett, Harvard University, USA: *Asymptotic properties of Markov decision processes.* Sal M3, KTH, Brinellvägen 64. Se Bråket nr 16 sidan 5.

Må 05–04 kl. 13.15 – 14.15. DNA-seminariet Uppsala-KTH (Dynamical systems, Number theory, Analysis). Björn Winckler, KTH: *Renormalization fixed points: one algorithm to find them all.* Sal 64119, Ångströmlaboratoriet, Uppsala universitet. Se Bråket nr 16 sidan 4.

Observera att Björn Wincklers seminarium har flyttats till den 4 maj. I Bråket nr 16 anges fel dag för detta seminarium.

Fortsättning på nästa sida.

Philosophy and Foundations of Mathematics: Epistemological and Ontological Aspects

En konferens med denna titel skall äga rum i Uppsala den 5 – 8 maj. Se Bråket nr 14 sidorna 5 – 7.

Disputation i matematik

Karl Rökaeus skall disputera vid SU på avhandlingen *Grothendieck Rings and Motivic Integration* fredagen den 15 maj kl. 10.00. Se sidorna 11 – 12.

Seminarier (fortsättning)

Ti 05–05 kl. 13.15. Seminar in Fluid Mechanics. *(Observera dagen, tiden och lokalen!)* **Hiroshi Higuchi,** Syracuse University: *Separated flow control and bluff-body wake.* Sal E53, KTH, Osquars Backe 14, 2 tr. Se sidan 5.

Ti 05–05 kl. 13.15. Plurikomplexa seminariet. Hannah Markwig, Göttingen: *Tropical Hurwitz numbers.* Rum 306, hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 4.

Ti 05–05 kl. 14.00–15.00. Institut Mittag-Leffler Seminar. Harry Kesten, Cornell University, Ithaca: *Random walk with occasionally modified transition probabilities.* Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 6.

Ti 05–05 kl. 15.30–16.30. Institut Mittag-Leffler Seminar. Ofer Zeitouni, University of Minnesota, Minneapolis: *Some aspects of large deviations for RWRE.* Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 4.

On 05–06 kl. 10.00–11.00. Presentation av examensarbete i matematik (30 högskolepoäng, avancerad nivå). **Alexander Funcke:** *Strong homotopy algebras. Introducing and explicitly constructing A_∞ and L_∞ algebras.* Handledare: **Sergei Merkulov.** Sal 21, hus 5, Matematiska institutionen, SU, Kräftriket. Se sidan 8.

On 05–06 kl. 10.15–11.15. Kombinatorikseminarium. Vic Reiner, University of Minnesota: *Diameter of the graph of reduced words.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 6.

On 05–06 kl. 10.15. Licentiatseminarium i strömningsmekanik. Bengt E. G. Fallenius, Mekanik, KTH, presenterar sin licentiatavhandling: *A new experimental setup for studies on wake flow instability and its control.* Opponent: **Universitetslektor Christoffer Norberg,** Lunds Tekniska Högskola. Sal E51, KTH, Osquars Backe 14, 2 tr. Se Bråket nr 16 sidan 7.

On 05–06 kl. 10.30–12.00. Extra skrivforskningskollokvium vid Institutionen för nordiska språk, SU. Associate Professor Natasha Artemeva, Carleton University, Ottawa, Canada: *Unacknowledged genres of university teaching: Chalk talk in mathematics.* Sal D389, Institutionen för nordiska språk, SU, Södra husen, Frescati. Se Bråket nr 16 sidan 8.

On 05–06 kl. 11.00–12.00. KTH/Nordita/SU Seminar in Theoretical Physics. Frederic P. Schuller, Albert Einstein Institute: *Geometry from quantum matter.* Sal FA31, Roslagstullsbacken 21, AlbaNova universitetscentrum. Se sidan 7.

On 05–06 kl. 13.15–14.15. Seminarium i analys och dynamiska system. Michael Björklund, KTH: *Expander phenomena for Bohr sets.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 7.

On 05–06 kl. 13.15–15.00. Algebra and Geometry Seminar. Torsten Ekedahl: *Flag bundles with non-special structure group.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 7.

On 05–06 kl. 16.00. KTH/SU Mathematics Colloquium. Bálint Tóth, Technical University Budapest: *Random walks with long memory.* 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 6.

Fortsättning på nästa sida.

Seminarier (fortsättning)

To 05–07 kl. 13.15 – 14.15. DNA-seminariet Uppsala-KTH (Dynamical systems, Number theory, Analysis). Kristian Bjerklöv, KTH: *Quasi-periodic perturbation of quadratic maps.* Sal 64119, Ångströmlaboratoriet, Uppsala universitet. Se Bråket nr 16 sidan 8.

To 05–07 kl. 14.00 – 15.00. Institut Mittag-Leffler Seminar. Maria Deijfen, SU: *Invariant random graphs with prescribed iid degrees.* Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 8.

To 05–07 kl. 15.15 – 16.15. AlbaNova and Nordita Colloquium in Physics. Peter Fulde, MPI for Complex Systems, Dresden: *Superconductivity through intra-atomic excitations.* Oskar Kleins auditorium, Roslagstullsbacken 21, AlbaNova universitetscentrum. Se Bråket nr 16 sidan 9.

To 05–07 kl. 15.30 – 16.30. Institut Mittag-Leffler Seminar. Kimmo Eriksson, Mälardalens högskola, Västerås: *Cultural evolution as a random walk on integer partitions.* Institut Mittag-Leffler, Auravägen 17, Djursholm. Se sidan 8.

Fr 05–08 kl. 10.00. Licentiatseminarium i matematisk statistik. Susanna Björkwall presenterar sin licentiatavhandling: *Bootstrapping for claims reserve uncertainty in general insurance.* Inbjuden diskussionsinledare: **Professor Göran Högnäs,** Matematiska institutionen, Åbo Akademi. Rum 306 (Cramérrummet), hus 6, Matematiska institutionen, SU, Kräftriket. Se sidan 9.

Fr 05–08 kl. 10.15 – 11.15. DNA-seminariet Uppsala-KTH (Dynamical systems, Number theory, Analysis). Michael Benedicks, KTH: *Kneading sequences for the Double Standard Map.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 10.

Må 05–11 kl. 13.15. Seminar in Fluid Mechanics. *(Observera dagen, tiden och lokalen!)* **Zhensu She,** Peking University: *Universal hierarchical symmetry for turbulence and general multi-scale fluctuation systems.* Sal E36, KTH, Lindstedtsvägen 3, b.v. Se sidan 9.

Må 05–11 kl. 15.15 – 17.00. Seminarium i finansiell matematik. Professor Alexander J. McNeil, Department of Actuarial Mathematics and Statistics, Heriot-Watt University, Edinburgh: *From Archimedean to Liouville copulas.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 12.

Ti 05–12 kl. 18.00. Populärvetenskaplig föreläsning i fysik. Magnus Axelsson, Astronomi, SU: *Svarta hål: Om universums mörkaste, och ljusaste, objekt.* Oskar Kleins auditorium, Roslagstullsbacken 21, AlbaNova universitetscentrum. Se sidan 12.

On 05–13 kl. 11.00 – 12.00. KTH/Nordita/SU Seminar in Theoretical Physics. Mikko Alava: *Solution space in satisfiability problems.* Sal FA31, Roslagstullsbacken 21, AlbaNova universitetscentrum. Se sidan 10.

On 05–13 kl. 13.15 – 14.15. Seminarium i analys och dynamiska system. Jeffrey Steif, Göteborg: *The dynamical circle covering problem.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 5.

Fortsättning på nästa sida.

Seminarier (fortsättning)

On 05–13 kl. 16.00. KTH/SU Mathematics Colloquium. Professor emeritus Harry Kesten, Cornell University: *Title to be announced.* 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 05–14 kl. 13.15 – 14.15. DNA-seminariet Uppsala-KTH (Dynamical systems, Number theory, Analysis). Elena Ushakova, Uppsala universitet: *Title to be announced.* Sal 64119, Ångströmlaboratoriet, Uppsala universitet.

To 05–14 kl. 15.15 – 16.15. AlbaNova and Nordita Colloquium in Physics. Professor Hugo Lagerkrantz, Karolinska Institutet: *The Big Bang of the human brain — on the making of the brain and the emergence of consciousness.* Oskar Kleins auditorium, Roslagstullsbacken 21, AlbaNova universitetscentrum. Se sidan 11.

PLURIKOMPLEXA SEMINARIET

Hannah Markwig:
Tropical Hurwitz numbers

Abstract: Hurwitz numbers count genus g, degree d covers of the projective line, with specified ramification profile over a fixed set of points. In tropical geometry, algebraic curves are degenerated to certain piece-wise linear graphs called tropical curves. This process "loses a lot of information", but many properties of the algebraic curve can be read off from the tropical curve, and remarkably many theorems that hold for algebraic curves continue to hold on the tropical side. One example of this phenomenon are the Hurwitz numbers: In this talk, we define tropical Hurwitz numbers, i.e., tropical genus g, degree d covers of the tropical projective line, and we show that the thus defined tropical Hurwitz numbers are equal to their classical counterparts. This equality leads to new insights in the structure of Hurwitz numbers. No background in number theory is assumed.

This is joint work with Renzo Cavalieri and Paul Johnson.

Tid och plats: Tisdagen den 5 maj kl. 13.15 i rum 306, hus 6, Matematiska institutionen, SU, Kräftriket.

INSTITUT MITTAG-LEFFLER SEMINAR

Ofer Zeitouni:
Some aspects of large deviations for RWRE

Abstract: I will review the model of RWRE and focus on the analysis of large deviations for the model. For dimension $d = 1$, it is known that the annealed and quenched rate functions differ, and analytical properties of the rate functions have also been established. The existence of a LDP for $d > 1$ has been established by Varadhan. Recently, significant advance has been achieved in the understanding of the resulting rate functions, mostly by Peterson and by Yilmaz. I will describe the recent progress and emphasize the role of certain intersection estimates, as well as links with other statistical mechanics problems.

Tid och plats: Tisdagen den 5 maj kl. 15.30 – 16.30 vid Institut Mittag-Leffler, Auravägen 17, Djursholm.

SEMINAR IN FLUID MECHANICS

Hiroshi Higuchi:
Separated flow control and bluff-body wake

Abstract: This talk will introduce some experimental studies on separated vortical flows. A very canonical geometry studied, but in a unique set up, is a right-ended circular cylinder with its axis aligned in the flow direction. The flow conditions are well-defined, the length to diameter ratio and the Reynolds number, and Eiffel first measured the dependence of drag coefficient on its fineness ratio. The flow field, however, is complex due to the leading-edge separation and reattachment and lack thereof depending on the cylinder length, and three-dimensional unsteady vertical wake behind. Our test model was suspended magnetically in the wind tunnel without any hardware support and the flowfield was measured with PIV. The instantaneous current needed to keep the model in place in turn gave instantaneous six components of forces/moments acting on the model. Next example is a wake of a disk and its control. Unlike the flow over a smooth curved surface, such as a sphere, controlling the flow past a sharp-edge object like a disk is challenging since the separation point/line is fixed. In this study in air and in water, the disk edge was equipped with mechanical actuators or synthetic jets, respectively. The open-loop excitation of the sear flow resulted in enhancement of helical structure and reduction of the reverse flow region as well as increased base drag. Another flow example is taken from sports engineering. Finally, from viewpoint of indoor air quality applications, other vortical flows in bluff-body wakes and unsteady jets will be introduced.

Tid och plats: Tisdagen den 5 maj kl. 13.15 i sal E53, KTH, Osquars Backe 14, 2 tr.

SEMINARIUM I ANALYS OCH DYNAMISKA SYSTEM

Jeffrey Steif:
The dynamical circle covering problem

Abstract: The classical circle covering problem introduced by Dvoretzky is the following question: Suppose that $I_1, I_2, I_3, \ldots$ are intervals of decreasing lengths $l_1, l_2, l_3, \ldots$ and that these intervals are independently and uniformly distributed on the circle of unit circumference. It is a trivial consequence of Borel-Cantelli that any given point on the circle will a.s. be covered by infinitely many of these intervals iff the sum of the lengths is divergent, but will the whole circle be covered? Partial results on this were obtained by Dvoretzky and many others. Finally, Shepp (1972) proved that the answer is a.s. yes iff $\sum_{n=1}^{\infty} e^{l_1+\cdots+l_n}/n^2 = \infty$. Assuming that $l_n = c/n$ for a constant c, this implies that the whole circle will be covered infinitely often iff $c \geq 1$ (a special case which was known before Shepp).

We will consider a dynamical version of the problem where the intervals after having been given initial random positions move according to independent standard Brownian motions. Assume that $l_n = c/n$ for a constant c. Among other things we show that for $c < 2$ a.s. there are exceptional times when a given fixed point is covered only finitely often, whereas this is not the case when $c \geq 2$. We also show that when $c < 3$ there are a.s. exceptional times where the circle is not covered infinitely often, whereas when $c \geq 3$ the whole circle is covered all the time.

This is joint work with Johan Jonasson.

Tid och plats: Onsdagen den 13 maj kl. 13.15 – 14.15 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

INSTITUT MITTAG-LEFFLER SEMINAR

Harry Kesten:
Random walk with occasionally modified transition probabilities

Abstract: Origin of this work is a question by Benjamini. Consider a "random walker" on $\mathbb{Z}$ who takes a step from a symmetric (discrete) Cauchy distribution every time he is at a fresh point and takes a simple RW step at other times. Is this walk recurrent? Does it satisfy a WLLN? A SLLN? I.e., if S_n is the position of the walker at time n, is $S_n = 0$ infinitely often? Does $(1/n)S_n \to 0$ in probability or with probability 1?

Tid och plats: Tisdagen den 5 maj kl. 14.00 – 15.00 vid Institut Mittag-Leffler, Auravägen 17, Djursholm.

KOMBINATORIKSEMINARIUM

Vic Reiner:
Diameter of the graph of reduced words

Abstract: There is a natural graph structure on the set of all reduced words for the longest element in a finite Coxeter group W. Recently Autour and Dehornoy showed that when $W = S_n$, the symmetric group on n letters, the diameter of this graph grows asymptotically as $O(n^4)$.

This talk will explain why this diameter for $W = S_n$ is exactly $n(n-1)(n-2)(3n-5)/24$. The idea is to rephrase the problem as a natural general question about hyperplane arrangements, and minimal galleries from a chamber to its opposite chamber. We then show how to answer this question for hyperplane arrangements which are *supersolvable,* covering the case of $W = S_n$ (type A_{n-1}) and also the case where $W = B_n$, the hyperoctahedral group. The general question is wide open.

The talk is based on joint work with Y. Roichman.

Tid och plats: Onsdagen den 6 maj kl. 10.15 – 11.15 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

KTH/SU MATHEMATICS COLLOQUIUM

Bálint Tóth:
Random walks with long memory

Abstract: Ordinary (e.g. simple symmetric) random walk models inter alia physical diffusion in particle systems. It is well-known that under diffusive scaling (that is: scaling space with square root of time) simple symmetric random walk converges weakly to (mathematical) Brownian motion. However, in truly interacting physical systems displacements of diffusing particles do *not* arise as sums of essentially independent steps and this causes relevant long range dependencies which could lead to dramatic consequences in the scaling behaviour. In my talk I will survey some natural examples of random walks and diffusions with long memory, which in low dimension ($d = 1, 2$) show anomalous scaling and in high dimension ($d = 3, 4, \ldots$) behave robustly, like ordinary random walk.

Tid och plats: Onsdagen den 6 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.

KTH/NORDITA/SU SEMINAR IN THEORETICAL PHYSICS

Frederic P. Schuller:
Geometry from quantum matter

Abstract: All we know about the structure of physical spacetime, we ultimately infer from the behaviour of matter inhabiting it. Restricting attention to classical matter, Einstein showed in this fashion how the properties of electromagnetic fields reveal an underlying metric structure of spacetime. General relativity then builds on taking the Lorentzian metric seriously as a dynamical object in its own right, providing a phenomenally successful theory of gravity. But all matter is quantum, and in this talk I will show how this leads to the emergence of a refined 'area metric' geometry. Gravitational dynamics for four-dimensional area metric manifolds then provide a theory of spacetime and matter, which surprisingly addresses the observed late-time accelerated expansion of the universe without a need for dark energy. The emergence of an area metric spacetime structure has further remarkable consequences for singularity theory and our understanding of physics in strong gravitational fields.

Tid och plats: Onsdagen den 6 maj kl. 11.00 – 12.00 i sal FA31, Roslagstullsbacken 21, AlbaNova universitetscentrum.

SEMINARIUM I ANALYS OCH DYNAMISKA SYSTEM

Michael Björklund:
Expander phenomena for Bohr sets

Abstract: For a given non-periodic Bohr subset of integers B, we give a sharp lower bound for the upper Banach density of $A + B$ for any subset A of integers in terms of densities of A and B. If the bound is attained, then A contains a Bohr substructure and B is essentially a one-dimensional Bohr set. To obtain the combinatorial results we study recurrence properties of ergodic measure preserving systems along Bohr sets.

The talk is based on joint work with Alexander Fish.

Tid och plats: Onsdagen den 6 maj kl. 13.15 – 14.15 i seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

ALGEBRA AND GEOMETRY SEMINAR

Torsten Ekedahl:
Flag bundles with non-special structure group

Abstract: I will start by recalling the notion, introduced by Grothendieck and Serre, of special algebraic group. Using a characterization of non-special groups due to Grothendieck we shall show that for each non-special connected algebraic group G there is a G-torsor over a smooth and projective base whose associated flag bundle has cohomology which is different from the cohomology of the product of the base and the flag variety (for a special group they are always equal). This will then be used to get a similar implication in the Grothendieck group of varieties.

Tid och plats: Onsdagen den 6 maj kl. 13.15 – 15.00 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

PRESENTATION AV EXAMENSARBETE I MATEMATIK

Alexander Funcke:
Strong homotopy algebras.
Introducing and explicitly constructing A_∞ and L_∞ algebras

Handledare: **Sergei Merkulov.**

Abstract: The essay is intended to be an introduction to the strong homotopy algebras called L_∞ and A_∞. They are presented not only using the necessary definitions and theorems, but also with a slim over-view of some common constructions in general homological algebra. The latter is intended to provide a setting for thinking about the algebras. Beyond the introductory material, the essay also describes how explicit constructions of both L_∞ and A_∞ algebras may be conducted. Finally, in the last chapter there are three examples of constructions of L_∞ algebras from various graded polynomial rings.

Tid och plats: Onsdagen den 6 maj kl. 10.00 – 11.00 i sal 21, hus 5, Matematiska institutionen, SU, Kräftriket.

INSTITUT MITTAG-LEFFLER SEMINAR

Maria Deijfen:
Invariant random graphs with prescribed iid degrees

Abstract: Models for generating random graphs with prescribed degree distribution have been extensively studied the last few years. Most existing models for this purpose, however, do not take spatial aspects into account, that is, there is no metric defined on the vertex set. I will discuss spatial versions of the problem. More precisely, given a degree distribution F and a spatial vertex set — for instance Z^d or the points of a spatial Poisson process — how should one go about to obtain a translation invariant random graph on the given vertex set with degree distribution F? Which properties do the resulting configurations have? I will describe some existing results and a number of open problems.

Tid och plats: Torsdagen den 7 maj kl. 14.00 – 15.00 vid Institut Mittag-Leffler, Auravägen 17, Djursholm.

INSTITUT MITTAG-LEFFLER SEMINAR

Kimmo Eriksson:
Cultural evolution as a random walk on integer partitions

Abstract: Research on cultural evolution has typically borrowed mathematical models from population genetics. After a brief discussion of pros and cons of this practice, I will present recent work of myself and coauthors from the Centre for the Study of Cultural Evolution on some mathematical problems arising from questions in cultural evolution. The model we use can be interpreted as a random walk on integer partitions, and is closely related to the Moran model in population genetics.

Tid och plats: Torsdagen den 7 maj kl. 15.30 – 16.30 vid Institut Mittag-Leffler, Auravägen 17, Djursholm.

LICENTIATSEMINARIUM I MATEMATISK STATISTIK

Susanna Björkwall

presenterar sin licentiatavhandling:

Bootstrapping for claims reserve uncertainty in general insurance

Inbjuden diskussionsinledare: **Professor Göran Högnäs,** Matematiska institutionen, Åbo Akademi.

Abstract: Bootstrapping is a popular technique in practice as well as in the literature in order to assess the variability of the actuary's estimate of the claims reserve. However, much focus so far has been on developing resampling schemes for, in particular, the chain-ladder method.

In this thesis we first develop the chain-ladder bootstrap to obtain a non-parametric and a parametric procedure that work for other development factor methods as well. We assume that the bootstrap procedure only depends on the mean and the variance of the claims and that the chosen reserving algorithm implicitly specifies the mean structure. The parametric bootstrap procedure is then extended to be applicable for the separation method. To this end, we introduce a parametric framework within the separation model, which enables joint resampling of claim counts and claim amounts.

Presentationen hålls på svenska.

Tid och plats: Fredagen den 8 maj kl. 10.00 i rum 306 (Cramérrummet), hus 6, Matematiska institutionen, SU, Kräftriket.

SEMINAR IN FLUID MECHANICS

Zhensu She:
Universal hierarchical symmetry for turbulence and general multi-scale fluctuation systems

Abstract: Scaling is an important measure of multi-scale fluctuation systems. Turbulence as the most remarkable multi-scale system possesses scaling over a wide range of scales. She-Leveque (SL) hierarchical symmetry, since its publication in 1994, has received wide attention. A number of experimental, numerical and theoretical works have been devoted to its verification, extension, and modification. Application to the understanding of magneto-hydrodynamic turbulence, motions of cosmic baryon fluids, cosmological supersonic turbulence, natural image, spiral turbulent patterns, DNA anomalous composition, human heart variability are just a few among the most successful examples. A number of modified scaling laws have been derived in the framework of the hierarchical symmetry, and the SL model parameters are found to reveal both the organizational order of the multi-scale system and the properties of the most significant fluctuation structures. A partial set of work related to these studies are reviewed. Particular emphasis is placed on the nature of the hierarchical symmetry. It is suggested that the SL hierarchical symmetry is a new form of the self-organization principle for multi-scale fluctuation systems and can be employed as a standard analysis tool in the general multi-scale methodology. It is further suggested that the SL hierarchical symmetry implies the existence of a turbulence ensemble. It is speculated that the search for defining the turbulence ensemble might open a new way for deriving statistical closure equations for turbulence and other multi-scale fluctuation systems.

Tid och plats: Måndagen den 11 maj kl. 13.15 i sal E36, KTH, Lindstedtsvägen 3, b.v.

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

Michael Benedicks:
Kneading sequences for the Double Standard Map

Abstract: Maps from the double standard map family

$$f_a(x) = 2x + a + (1/\pi)\sin(2\pi x) \pmod 1$$

have the property that they are double covers of the circle onto itself with a unique inflexion point. They have been investigated most recently by M. Misiurewicz and A. Rodrigues. In particular one can say that they are hybrids between circle homeomorphisms with inflexions and quadratic maps of the interval.

The aim of the talk is to develop symbolic dynamics and kneading theory for these maps and discuss the behaviour in parameter space (chaotic behaviour, stable periodic orbits), comparing the situation to the more standard cases of circle homeomorphisms and quadratic interval maps.

This is joint work with A. Rodrigues.

Tid och plats: Fredagen den 8 maj kl. 10.15 – 11.15 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

KTH/NORDITA/SU SEMINAR IN THEORETICAL PHYSICS

Mikko Alava:
Solution space in satisfiability problems

Abstract: Combinatorial optimization is a very recent playground for statistical physics since many ideas of glassy systems apply directly. A paradigm of a computer science problem here is the question of satisfiability, as to a logical clause can be "satisfied" without contradiction by assigning to the logical values a suitable set of values (true/false). In the classical K-satisfiability problem one can in fact distinguish a phase diagram, where an increasing constraint density induces a transition from a solvable region to one where instances of K-SAT problems become "UNSAT" or unsatisfiable. The interest of the physics community was catalyzed once it was realized that these problems can be directly translated into spin glass ones, and finding a solution for an instance is seen to be equivalent to finding a groundstate for a disorder configuration. This has lead to a flurry of activity with the main emphasis on predictions of the phase diagram — whether the solution space is broken into "clusters" of solutions — and on methods of solving these problems such as "Survey Propagation" or focused local algorithms. In this talk I discuss some recent attempts to understand the actual solution space. We have simulated diffusion processes on the zero-energy manifold. This provides information on the local and global structure of the solution space and furnishes an interesting example of diffusion on a hypercube in the presence of dynamically generated disorder.

The talk is based on joint work with S. Seitz and P. Kaski.

Tid och plats: Onsdagen den 13 maj kl. 11.00 – 12.00 i sal FA31, Roslagstullsbacken 21, AlbaNova universitetscentrum.

ALBANOVA AND NORDITA COLLOQUIUM IN PHYSICS

Hugo Lagerkrantz:
The Big Bang of the human brain —
on the making of the brain and the emergence of consciousness

Abstract: The quest for the emergence of the human brain and its consciousness belongs to one of the key puzzles confronting scientific worldview. The neural tube may be formed by a default pathway three weeks after conception. The cranial part is "ballooning" due to induction by the sonic hedge-hog protein. 10 – 20 weeks after conception about 200 000 new neurons are formed per minute. The neurons sprout and become connected via synapses. Synaptogenesis is stimulated by sensory input and peaks during early childhood (1 million newsynapes every second!). The infant brain is more like a jungle than a computer. There is a redundancy of neuronal branches. Optimal pathways are selected due to activity and epigenetic mechanisms. The newborn brain is not blank as earlier believed. The physicist Peter Fransson has together with us demonstrated that there is a spontaneous resting activity in the cortex by the use of functional MRI. The newborn infant seems to be aware of itself and to a limited extent of the surrounding world, i.e. he/she is probably conscious.

Tid och plats: Torsdagen den 14 maj kl. 15.15 – 16.15 i Oskar Kleins auditorium, Roslagstullsbacken 21, AlbaNova universitetscentrum.

DISPUTATION I MATEMATIK

Karl Rökaeus

skall disputera på avhandlingen

Grothendieck Rings and Motivic Integration

fredagen den 15 maj 2009 kl. 10.00 i sal 14, hus 5, Matematiska institutionen, SU, Kräftriket. Till opponent har utsetts *professor Johannes Nicaise,* Laboratoire Painlevé, Université Lille 1.

Abstract of the thesis

This thesis consists of three parts:

In Part I we study the Burnside ring of the finite group G. This ring has a natural structure of a lambda-ring. However, a priori the images of the G-set S under the lambda-operations can only be computed recursively. We establish an explicit formula, expressing these images as linear combination of classes of G-sets. This formula is derived in two ways: First we give a proof that uses the theory of representation rings in an essential way. We then give an alternative, more intrinsic, proof. This second proof is joint work with Serge Bouc.

In Part II we establish a formula for the classes of certain tori in the Grothendieck ring of varieties, in terms of its lambda-structure. More explicitly, we will see that if L^* is the torus of invertible elements in the n-dimensional separable k-algebra L, then the class of L^* can be expressed as an alternating sum of the images of the spectrum of L under the lambda-operations, multiplied by powers of the Lefschetz class. This formula is suggested from the cohomology of the torus, illustrating a heuristic method that can be used in other situations. To prove the formula will require some rather explicit calculations in the Grothendieck ring. To be able to make these we introduce a homomorphism from the Burnside ring of the absolute Galois group of k, to the Grothendieck ring of varieties over k. In the process we obtain some information about the structure of the subring generated by zero-dimensional varieties.

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In Part III we give a version of geometric motivic integration that specializes to p-adic integration via point counting. This has been done before for stable sets; we extend this to more general sets. The main problem in doing this is that it requires to take limits, hence the measure will have to take values in a completion of the localized Grothendieck ring of varieties. The standard choice is to complete with respect to the dimension filtration. However, since the point counting homomorphism is not continuous with respect to this topology, we have to use a stronger one. We thus begin by defining this stronger topology; we will then see that many of the standard constructions of geometric motivic integration work also in this setting. Using this theory, we are then able to give a geometric explanation of the behaviour of certain p-adic integrals, by computing the corresponding motivic integrals.

SEMINARIUM I FINANSIELL MATEMATIK

Alexander J. McNeil:
From Archimedean to Liouville copulas

Abstract: The Archimedean copula family is used in a number of actuarial and financial applications, including: the construction of multivariate loss distributions; frailty models for dependent lifetimes; models for dependent defaults in credit risk. We show how the Archimedean copulas are most usefully viewed as the survival copulas of so-called simplex distributions, which are scale mixtures of uniform distributions on simplices. This representation allows us to construct a rich variety of new Archimedean copulas in different dimensions and to solve in principle the problem of generating samples from any Archimedean copula. It also sheds light on the dependence properties of Archimedean copulas and their relationship to the mixing or so-called radial distribution of the simplex distribution.

Armed with these insights we generalize the Archimedean copulas to the Liouville copulas, which are the survival copulas of Liouville distributions, these being scale mixtures of Dirichlet distributions. This generalization yields asymmetric, non-exchangeable copulas, whose properties can again be understood in terms of the mixing or radial distribution of the Liouville distribution.

Tid och plats: Måndagen den 11 maj kl. 15.15 – 17.00 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

POPULÄRVETENSKAPLIG FÖRELÄSNING I FYSIK

Magnus Axelsson:
Svarta hål: Om universums mörkaste, och ljusaste, objekt

Sammanfattning: Svarta hål är för många universums mest märkliga objekt. Rent teoretiskt är de dock ovanligt enkla att beskriva. Idag har astronomer funnit tecken på svarta hål på vitt skilda skalor, från stjärnrester i vår närmaste omgivning till supermassiva svarta hål som kan påverka utvecklingen av en hel galax. I detta föredrag presenteras varför astronomer tror att svarta hål finns, och hur vi kan studera dem i den svarta rymden.

Tid och plats: Tisdagen den 12 maj kl. 18.00 i Oskar Kleins auditorium, Roslagstullsbacken 21, AlbaNova universitetscentrum.

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 2009. 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.
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. Lunds universitet söker en biträdande universitetslektor (associate senior lecturer) i matematisk statistik med inriktning mot statistiska metoder och modeller inom biologi och medicin. Sista ansökningsdag är den 31 juli. Web-info: http://www3.lu.se/info/lediga/admin/document/PA2009-1148.pdf.
12. Institutionen för matematik vid KTH söker vikarierande lektorer i matematik. Anställningarna är tidsbegränsade till 6 – 12 månader från och med den 1 juli 2009. Sista ansökningsdag är den 20 maj. Web-info: http://www.math.kth.se/lektorsvik.20090520.pdf.

Old information

Jobs to apply for

13. Institutionen för matematik vid KTH söker doktorander i matematik. Sista ansökningsdag är den 22 maj. Web-info: http://www.math.kth.se/doktorand_vt09.html.
14. Linköpings universitet söker en professor i beräkningsvetenskap. Sista ansökningsdag är den 8 maj. Web-info: http://www.liu.se/jobbdb/show.html?2827.
15. Karlstads universitet söker en universitetslektor i matematikdidaktik. Sista ansökningsdag är den 11 maj. Web-info: http://www.kau.se/om-universitetet/lediga-tjanster?to_do=detail&tjanst_id=2044.
16. Karlstads universitet söker en professor i matematikdidaktik. Sista ansökningsdag är den 11 maj. Web-info: http://www.kau.se/om-universitetet/lediga-tjanster?to_do=detail&tjanst_id=2043.
17. SU söker två doktorander i matematik. Anställningarna har ämnesbeskrivningarna "Geometric invariants of finite groups" respektive "Geometry on configuration spaces with applications to homological algebra, number theory, and quantization". Sista ansökningsdag är den 4 maj. Web-info: http://www.math.su.se/content/1/c6/02/88/39/applic09.pdf.
18. SU söker två doktorander i matematisk statistik. Sista ansökningsdag är den 4 maj. Web-info: http://www.math.su.se/content/1/c6/02/88/39/FoutbVT09.pdf.
19. Lunds universitet söker en eller två doktorander i matematisk statistik. Sista ansökningsdag är den 8 maj. Web-info: http://www3.lu.se/info/lediga/admin/document/PA2009-1208eng.pdf.

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20. Uppsala universitet söker en professor i matematisk statistik. Sista ansökningsdag är den 15 maj. Web-info: http://www.math.uu.se/inform/vacant.php.
21. Institutionen för matematik vid KTH söker två doktorander i finansiell matematik/matematisk statistik. Sista ansökningsdag är den 30 april. Web-info: http://www.math.kth.se/finansdokt.html.