INFOMAT

Oktober 2008

Kjære leser!

Selv om vi fortsatt har litt sol og gode varmegrader er det ikke lenge til vinteren og dermed tida for å planlegge en tur til Rondane. Les mer om Ski og Matematikk 2009 i dette nummeret.

Høsten ser ut til å være de nasjonale fagmøters tid, både algebra og topologi har nær forestående møter på nasjonalt plan.

Og til slutt er det på tide å minne fagmiljøene på å tenke på å søke om programmer ved Institut Mittag-Leffler, søkndasfristen er rett over nyttår.

hilsen Arne B.

SKI OG MATEMATIKK
Rondablikk, 3.-6. januar 2009

Åpent for påmelding på:

http://www.math.uio.no/~dnormann/skiogmatematikk2009.html

ARRANGEMENTER

Nye doktorgrader:
Marte Godvik forsvarer 20. oktober sin avhandling *On a Traffic Flow Modell*. Hovedveileder har vært førsteamanuensis Harald Hanche-Olsen, Institutt for matematiske fag, NTNU.

Gjester i oktober:
Shahaf Hahamaov gjester professor Kristian Seip, Analysegruppen.
Gordana Todorov er gjest hos professor Idun Reiten, Algebragruppen.

Matematisk kalender

2008
Oktober:
30.-31. *Nasjonalt algebramøte,* Oslo.
November:
27.-28. *Nordisk topologimøte,* Trondheim.
Desember:
8.-9. *Onsager-forelesningen,*Trondheim.
2009
Januar:
3.-6. *Ski og matematikk,*Rondane.
Juni:
1.-4. Abelsymposiet, *Combinatorial aspects of commutative algebra and algebraic geometry,* Voss
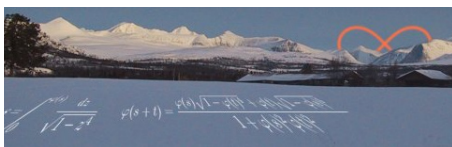**8.-11.** *Britisk-Nordisk Matematikerkonf.*, Oslo
Oktober:
12.-17. *An international Conference on Stochastic Analysis and Applications*, Hammamet, Tunisia (CMA).

SKI OG MATEMATIKK
Rondane, 3.-6. januar 2009

Formålet med Ski og Matematikk er å bringe skiglade matematikere fra Norge og utland sammen til faglig og sosialt samvær.

NASJONALT ALGEBRAMØTE, Oslo, 30.-31. oktober 2008

Torsdag 30. og fredag 31. oktober inviterer vi til det 2. nasjonale algebramøte i Oslo. Møtet er for alle som er interessert i algebra eller algebraisk geometri ved universiteter og høgskoler i Norge. Hensikten med møtet er å gi hverandre innsikt i hva som foregår innen forskning i algebra og algebraisk geometri i Norge. Møtet vil bli holdt på Blindern.
Send en epost til Arne B. Sletsjøe (arnebs@math.uio.no) dersom du er interessert i å delta. Deltakere som ønsker å holde et faglig foredrag bes gi beskjed om dette.

geometry/ topology

NORDISK TOPOLOGIMØTE, Trondheim, 27.-28. november

The Topology group at NTNU in Trondheim and the project Topology in Norway have the great pleasure to invite fellow topologist to the second Nordic Topology Meeting in Trondheim 27 - 28 November 2008.
The programme will start on Thursday 27th November at 10 am and end on Friday 28th November at 5 pm.
All participants are kindly asked to register by email to Inger Seehus (inger.seehusmath.ntnu.no), informing about how many nights you require a hotel room.
Please register as soon as possible for hotel reservations, and no later than **Friday 17th October.**

INSTITUT MITTAG-LEFFLER

CALL FOR PROPOSALS
FOR 2011 - 2012

The board of Institut Mittag-Leffler invites program proposals for the academic year 2011-2012. The Institute runs research programs in specialized areas of mathematics to which leading scientists are invited. Post-docs and advanced graduate students are offered fellowships to participate in a concurrent junior visiting program.

Here is a summary of information about the programs: The programs can run for the whole year, or be of semester length (Sept 1 - Dec 15 and Jan 15 - June 15, respectively). Around 25-28 visitors are in residence at any given time. Participation in the research programs is by invitation only. The mini-

mum length of stay is one month. It is expected that two or three leading mathematicians will stay for at least a semester each. Seminars are conducted one or two afternoons per week. There is an emphasis on free time for research and interaction. Lecture series or informal seminars specifically for the junior participants are encouraged. Normally no workshops are organized at the Institute in connection with the scientific programs.

The Institute is housed in a patrician 19th century villa in a suburb of Stockholm. Visitors are housed on the premises. Lists of past, present and future programs can be found at www.mittag-leffler.se.

Each scientific program is led by an organizing committee, usually consisting of 2-4 well-established mathematicians. This committee is expected to suggest invitees to the board work closely with the director in planning the program take responsibility for scientific, educational and social issues during the period of the program make sure that at least

one member of the committee is present at all times during the program have at least one member from a Scandinavian country.

The selection criteria for proposals are scientific strength and timeliness, and the degree to which the program would benefit mathematical research and post-graduate training in Scandinavia.

Proposals should contain:

*a description of the intended area of specialization motivation why the proposed program is likely to move this area forward plans, if any, for the training of junior participants,

*a list of suggested invitees, most of whom should have indicated an interest in the program and a willingness to participate for at least one month a description of the Scandinavian connection the members of the proposed organizing committee one member of the organizing committee designated to serve as contact person.

The deadline for applications is **January 15, 2009.**

For further information, consult the Institute home page www.mittag-leffler.se or contact the director, Professor Anders Björner bjorner@mittag-leffler.se

POST DOCTORAL FELLOWSHIP GRANTS FOR 2009/2010

Institut Mittag-Leffler announces a number of grants for the academic year 2009/2010. The grants, intended for recent PhDs and advanced graduate students, consist of:

*a stipend amounting to 10,000 - 13,000 SEK per month,(For PhDs living in the Stockholm area an extra rent allowance will be paid)

*travel expenses to and from Stockholm,

*accommodation free of charge and office space Preference will be given to applications for longer stays, preferably for a semester.

The subject areas for the year's two programs are:

Mathematical Logice: Set theory and model the-

ory, fall 2009

Dynamics and PDE:s, spring 2010

In order to be considered for one of these grants you must fulfill the following conditions:

*your research interest must fall within the area of the program,

*you must be either an advanced graduate student or a recent PhD (degree obtained in 2005 orlater),

Applications should be sent no later than **January 20, 2009.**

Inquiries may be directed to the Institute director, Prof. Anders Björner bjorner@mittag-leffler.se or, for practical matters, to Ms. Marie-Louise Koskull koskull@mittag-leffler.se

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H. Clemens, Chair of the DCSG:

A year ago two lecturers were sought to participate in the beautifulproject of the French organization CIMPA (Centre International deMathématiques Pures et Appliquées) to help rebuild the mathematics infrastructure in Cambodia. The context of this work was described to potential volunteers as follows:

We seek lecturers for intensive 3-4 week courses at universities in the developing world, at the advanced undergraduate level. The lecturer would be assisted by a local mathematics professor who prepares the students beforehand, assists when necessary during the course, and takes care of any necessary follow-up. These courses should have a student audience of 20 or more, be controlled, with examinations, and be part of a regular degree program at the university at which they are offered.

Past experience in the developing world is desirable but not necessary. However what is required is tolerance for working in circumstances of modest resources, unexplained inefficiencies, and limited physical comforts.

Funds for all expenses, including travel, will be provided; however, we request that the mathematician's home institution offer leave with pay during his/her 3-4 week absence. We believe that a strong case can be made that cooperation with

this program will not only bring personal and professional benefit to the lecturer, but will also redound to the credit of the lecturer's institution.

40 volunteers immediately responded! Such an outpouring of interest in contributing to the formation of students of mathematics in the developing world could not be ignored! The Developing Countries Strategy Group of the International Mathematical Union, in cooperation with CIMPA and the U.S. National Committee for Mathematics, have built on that nucleus of 40 volunteers to launch the "Volunteer Lecturer Program" (VLP), whose goal is to provide mathematician volunteers to give intensive month-long courses at universities in the developing world. The program is quite modest in size due to the limited financial resources of the sponsoring organizations. But mathematicians interested in participating in the VLP, universities in the developing world interested in hosting lecturers to teach in the context described above, and, as importantly, donors desiring to provide the E.3000 necessary to support a VLP lecturer, should contact: Sharon Berry Laurenti, Administrative Secretary, Developing Countries Strategy Group of the International Mathematical Union, e-mail: cde@ictp.it

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EMMY NOETHER LECTURER: FOR ICM 2010 IN HYDERABAD

Emmy Noether was one of the great mathematicians of her time, someone who worked and struggled for what she loved and believed in. Her life and work remain a tremendous inspiration. The 2010 Emmy Noether Lecture will be presented as a plenary lecture at the International Congress of Mathematicians in August 2010 in Hyderabad, to honour women who have made fundamental and sustained contributions to the mathematical sciences.

There have been Emmy Noether Lectures at four previous ICMs, and this will be the second time that the selection of the Emmy Noether Lecturer has been made formally by the IMU. The IMU Executive Committee has established a committee of five, chaired by Cheryl Praeger (Australia), to select the 2010 Emmy Noether Lecturer. The committee will conduct their work over the next 6-9 months, and suggestions for consideration by the committee may be sent to Cheryl Praeger at praeger@maths.uwa.edu.au

MATHEMATICIANS ILLUMINATE DEEP CONNECTION BETWEEN CLASSICAL AND QUANTUM PHYSICS
Science Daily(Oct. 17, 2008)

In a seminar co-organized by Stanford University and the American Institute of Mathematics, Soundararajan announced that he and Roman Holowinsky have proven a significant version of the quantum unique ergodicity (QUE) conjecture.

This is one of the best theorems of the year, said Peter Sarnak, a mathematician from Princeton who along with Zeev Rudnick from the University of Tel Aviv formulated the conjecture fifteen years ago in an effort to understand the connections between classical and quantum physics.

I was aware that Soundararajan and Holowinsky were both attacking QUE using different techniques and was astounded to find that their methods miraculously combined to completely solve the problem, said Sarnak. Both approaches come from number theory, an area of pure mathematics which recently has been found to have surprising connections to physics.

The motivation behind the problem is to understand how waves are influenced by the geometry of their enclosure. Imagine sound waves in a concert hall. In a well-designed concert hall you can hear every note from every seat. The sound waves spread out uniformly and evenly. At the opposite extreme are "whispering galleries" where sound concentrates in a small area.

The mathematical world is populated by all kinds of shapes, some of which are easy to picture, like spheres and donuts, and others which are constructed from abstract mathematics. All of these shapes have waves associated with them. Soundararajan and Holowinsky showed that for certain shapes that come from number theory, the waves always spread out evenly. For these shapes there are no "whispering galleries."

The quantum unique ergodicity conjecture (QUE) comes from the area of physics known as "quantum chaos." The goal of quantum chaos is to understand the relationship between classical physics--the rules that govern the motion of mac-roscopic objects like people and planets when their motion is chaotic, with quantum physics-the rules that govern the microscopic world.

The work of Holowinsky and Soundararajan is brilliant, said physicist Jens Marklof of Bristol University, *and tells us about the behaviour of a particle trapped on the modular surface in a strong magnetic field*.

The problems of quantum chaos can be understood in terms of billiards. On a standard rectangular billiard table the motion of the balls is predictable and easy to describe. Things get more interesting if the table has curved edges, known as a "stadium." Then it turns out most paths are chaotic and over time fill out the billiard table, a result proven by the mathematical physicist Leonid Bunimovich.

In their QUE conjecture, Rudnick and Sarnak hypothesized that for a large class of systems, unlike the stadium there are no scars or bouncing ball states and in fact all states become evenly distributed. Holowinsky and Soundararajan's work shows that the conjecture is true in the number theoretic setting.

The conjecture of Rudnick and Sarnak deals with certain kinds of shapes called manifolds, or more technically, manifolds of negative curvature, some of which come from problems in higher arithmetic.
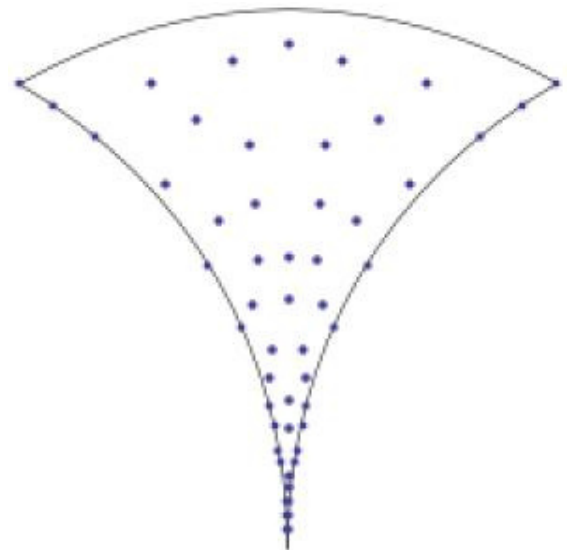
Fundamental domains and zeros of cusp forms. This picture shows the zeros of a weight 500 Hecke eigenform in a particular fundamental domain for SL(2,Z). Zeev Rudnick proved that QUE implies that the zeros of the associated cusp forms also are equidistributed in the (hyperbolic) upper half-plane. So, this picture is an illustration of the result of Holowinsky and Soundararajan. (Credit: Image courtesy of Fredrik Stromberg)

ONSAGER-FORELESNINGEN 2008

The corresponding waves are analogous to highly excited states in quantum mechanics. Soundararajan and Holowinsky each developed new techniques to solve a particular case of QUE. The "waves" in this setting are known as holomorphic Hecke eigenforms. The approaches of both researchers work individually most of the time and miraculously when combined they completely solve the problem. *Their work is a lovely blend of the ideas of physics and abstract mathematics*, said Brian Conrey, Director of the American Institute of Mathematics.

According to Lev Kaplan, a physicist at Tulane University, *This is a good example of mathematical work inspired by an interesting physical problem, and it has relevance to our understanding of quantum behavior in classically chaotic dynamical systems*.

TERENCE TAO ER LARS ONSAGER FORELESER 2008 VED NTNU

Hvert år avholdes det en Lars Onsager forelesning ved NTNU, oppkalt etter Lars Onsager (1903-1976; sivilingeniør NTH 1925, Nobelprisen i kjemi i 1968). Foreleseren er en fremragende forsker innen feltene kjemi, fysikk eller matematikk. Mer informasjon fins på websiden www.math.ntnu.no/onsager.

Årets foreleser er Terence Tao fra UCLA (http://www.math.ucla.edu/~tao/). Hans mange utmerkelser skulle være velkjente for INFOMATs lesere, så la oss nøye oss med å si at han tok PhD ved Princeton da han var 20 år gammel, ble full professor ved UCLA som 24-åring, og mottok Fields-medaljen i 2006. Han arbeider innen flere områder av matematikken - fra tallteori til differensialligninger.

Tao skal gi to forelesninger ved NTNU. **Mandag den 8. desember kl. 11:15-12:00** i R2, Gløshaugen, holder han den offisielle Onsager-forelesningen: *Structure and randomness in the prime numbers*}

Abstract: *God may not play dice with the universe, but something strange is going on with the prime numbers*" (Paul Erdös) The prime numbers are a fascinating blend of both structure (for instance, almost all primes are odd) and randomness. It is widely believed that beyond the "obvious" structures in the primes, the primes otherwise behave as if they were distributed randomly; this "pseudorandomness" then underlies our belief in many unsolved conjectures about the primes, from the twin prime conjecture to the Riemann hypothesis. This pseudorandomness has been frustratingly elusive to actually prove rigorously, but recently there has been progress in capturing enough of this pseudorandomness to establish new results about the primes, such as the fact that they contain arbitrarily long progressions. We survey some of these developments in this talk.

Tirsdag den 9. desember kl. 11:15-12:00 i EL2, Gløshaugen, holder han følgende forelesning: *Compressed sensing*

Abstract: Suppose one wants to recover an unknown signal x in R^n from a given vector $Ax=B$ in R^m of linear measurements of the signal x. If the number of measurements m is less than the degrees of freedom n of the signal, then the problem is underdetermined and the solution x is not unique. However, if we also know that x is *sparse* or *compressible* with respect to some basis, then it is a remarkable fact that (given some assumptions on the measurement matrix A) we can reconstruct x from the measurements b with high accuracy, and in some cases with perfect accuracy. Furthermore, the algorithm for performing the reconstruction is computationally feasible. This observation underlies the newly developing field of *compressed sensing*. In this talk we will discuss some of the mathematical foundations of this field.

Helge Holden
(leder av Onsager-komitéen ved NTNU)

SKI OG MATEMATIKK

SKI OG MATEMATIKK (2009)

Sted: Rondablikk høyfjellshotell.

Tid: 03.01.2009 -06.01.2009 med ankomst til lunsj 3/1 og avreise etter frokost 6/1.

Merk at dette året vil arrangementet gå fra lørdag til tirsdag.

Formålet med Ski og Matematikk er å bringe skiglade matematikere fra Norge og utland sammen til faglig og sosialt samvær. Potensielle deltagere som ønsker å presentere sine faglige interesser eller et tema de finner allment interessant for kolleger, inviteres til å melde inn foredrag. Det endelige programmet vil bli satt sammen ut fra hvilke forslag som kommer inn og ut fra hvem som melder seg på.

Priser
Pr. deltager/dobbeltrom NOK 2.150
Pr. samboer/ektefelle NOK 1.660
Pr. person/enkeltrom NOK 2.450.
Barn under 15 år i ekstraseng, NOK 250 pr døgn.
Hotellet kan formidle transport fra og til Vinstra stasjon. Prisen på transporten vil avhenge av hvor mange som benytter seg av de enkelte tilbud.

Bekreftede foredragsholdere pr dd.
Magnus B. Landstad
Arild Stubhaug

Lørdag 3/1:
15.15 - 16.00: TBA
16.00 - 16.30: Kaffepause
16.30 - 17.15: TBA
17.25 - 18.10: TBA

Søndag 4/1:
15.15 - 16.00 TBA

16.00 - 16.30: Kaffepause
16.30 - 17.15: TBA
17.25 - 18.10: TBA

Mandag 7/1:
15.15 - 16.00: TBA
16.00 - 16.30: Kaffepause
16.30 - 17.15: TBA
17.25 - 18.10: TBA

Påmelding
Dag Normann e-post dnormann@math.uio.no

Påmeldingsfrist: **15.12.2008.**
Deltagere som melder seg på alene, vil bli plassert på enkeltrom dersom de ikke ber om noe annet. Deltagere som melder seg på sammen vil bli plassert på dobbeltrom dersom de ikke ber om noe annet.

SKI OG MATEMATIKK

Noen bilder fra Rondane. Foreningen ønsker alle velkommen til Ski og Matematikk 2009.