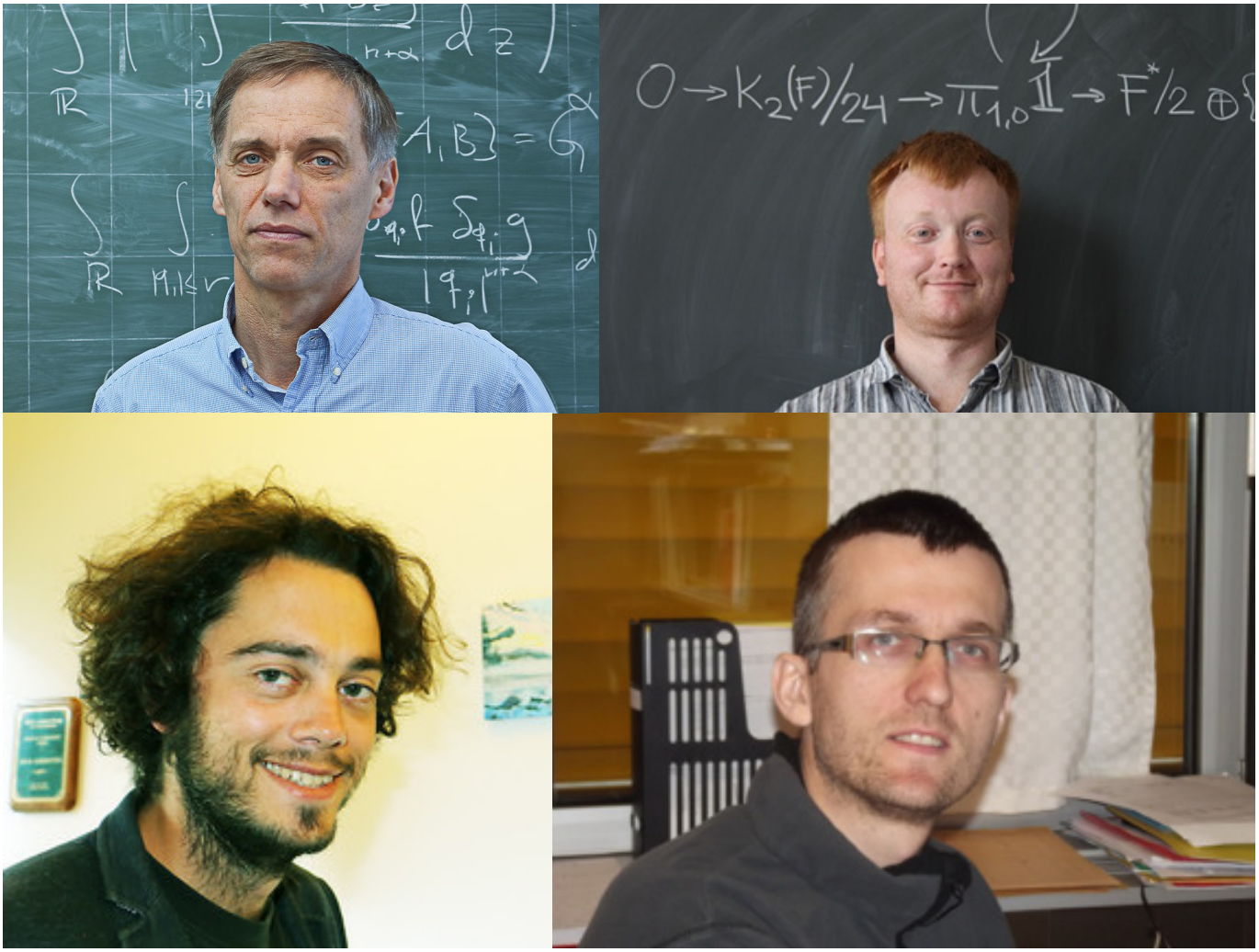
INFOMAT

Januar 2016



FIRE NYE TOPPFORSKINGS-PROSJEKTER (NFR) INNEN MATEMATISKE FAG

Fire nye toppforskere: Helge Holden, NTNU, Paul Arne Østvær, UiO, Jan Martin Nordbotten, UiB og Sibjørn Hervik, UiS

INFOMAT kommer ut med 11 nummer i året og gis ut av Norsk Matematisk Forening. Deadline for neste utgave er alltid den 15. i neste måned. Stoff til INFOMAT sendes til

infomat at math.ntnu.no

Foreningen har hjemmeside http://www.matematikkforeningen.no/INFOMAT
Ansvarlig redaktør er Arne B. Sletsjøe, Universitetet i Oslo.

Matematisk kalender

2016:
Mars:
15. *Abelprisen, offentliggjøring*, Oslo
16.-20. *27. Nordic Congress of Mathematicians*, Stockholm
April:
21.-22. *ASGARD Math 2016*, Oslo
Mai:
23.-25. *Abeluken med prisutdeling*, Oslo
Juni:
30.-1. juli: *AGMP 2016,* Tromsø
2017:
Januar:
27.-29. *Ragni Piene 70,* Oslo

ASGARD MATH 2016

A Scandinavian Gathering Around Remarkable Discrete Mathematics, UiO, 21.-22. april 2016

The ASGARD Math meetings are informal two-day meetings aimed at facilitating communication and interaction between mathematicians in Scandinavia interested in discrete mathematics and other related fields. These meetings will take place every year during the spring.
https://sites.google.com/site/asgardmath/

AGMP 2016

Algebraic Geometry and Mathematical Physics, Tromsø, 30. juni-1. juli 2016

A conference in honor of Arnfinn Laudal on his 80'th birthday. The conference will take place at the University of Tromsø (Norway), 30th June and 1st July 2016. The conference will consist of 4 invited lectures and contributed presentations. All talks will be plenary. The official language of the conference is English.
The conference will cover, but is not limited to, the main themes: Algebra, Geometry, dynamical symmetries and conservation laws, mathematical physics and applications.
http://site.uit.no/agmp/

27TH NORDIC CONGRESS OF MATHEMATICS IN STOCKHOLM

The 27th Nordic Congress of Mathematics in Stockholm be already very soon (March 16-20). The programme of the congress is very interesting.
1. I would like you to encourage members of your Societies to come to the congress and, if possible, provide with some financial support those who would like to attend the congress.
Note that we do not have any conference fees. Moreover, we shall provide free coffee and free lunches during the Congress.
2. If you are planning to come to Stockholm please register yourself and send information about the congress
http://www.mittag-leffler.se/congress-2016
to everyone at your Department + ask those who are planning to come to Congress to register http://www.mittag-leffler.se/congress-2016/registration
3. Please let people know that there will be two public lectures at hall E1, KTH, Stockholm, on the 15th of March, given by
13:00-14:00: Donald Ervin Knuth: All questions answered,
14:00- 15:00: Cedric Villani: TBA

With best wishes,
Ari Laptev

Nye doktorgrader

Magnus Bakke Botnan, NTNU, disputerte 17. desember 2015 med avhandlingen *Applications and Generalizations of the Algebraic Stability Theoerem*. Professor Nils Baas har vært veileder.

Sammendrag:
Topological data analysis is a relatively recent approach to data analysis where topological methods are applied to the study of (large, high-dimensional) data sets. Persistent homology is perhaps the most prominent such tool and it has found applications in a multitude of sciences. A key property of persistent homology is

that the topological signature is stable with respect to perturbation of the input data. There would be few credible applications of persistent homology without this property. The stability theorem was originally formulated in the language of R-valued functions, and was later cast in a more general algebraic form, in the language of persistence modules and interleavings. This formulation of the theorem is known as the Algebraic Stability Theorem (AST). The AST is involved, in one form or another, in nearly all theoretical results related to persistent homology.

In the first paper of the thesis we provide approximations to persistent homology computations of large data sets, and the AST is applied to give provable error bounds. This is joint work with Gard Spreemann (NTNU/EPFL). In the second paper the AST is generalized to a larger class of topological signatures. This is joint work with Michael Lesnick (Columbia U./Princeton U.). In the third paper we prove a structure theorem for pointwise finite dimensional zigzag persistence modules, or, in the language of quiver representations, locally finite dimensional representations of A_{∞}^{∞}.

Gard Spreemann, NTNU, disputerte 19.desember 2015 med avhandlingen *Persistent homology: Applications and a computational simplification*. Professor Nils Baas har vært veileder.

Sammendrag:

For many kinds of data (for example measurements from natural or social sciences, engineering or otherwise), it can be natural to ask topological questions. The degree-zero question can be phrased as "how connected are the data?" and its answer usually comes from classical clustering techniques. The higher-degree questions, "how many and how big are the 'loops' in the data?", "how many and how big are the ball-shaped holes in the data?", ..., can be answered with homology. The approximately 15 year old invention of persistent homology utilizes classical techniques from algebraic topology to answer such questions in a scale-independent way.

The thesis includes a novel way of approximating certain important constructions in some persistent homology calculations, as well as applications of persistent homology towards neuroscience.

Nyheter

CALL FOR APPLICATIONS: 4TH HEIDELBERG LAUREATE FORUM, SEPTEMBER 18 - 23, 2016

Dear Laureates,

Dear Friends and Supporters of the Heidelberg Laureate Forum,

Preparations for the 4th HLF are in full swing and as of November 1, the online application tool for the young researchers will be up and running. The application deadline is **February 3, 2016**.

Please find below the press release of October 27, 2015, announcing the start of the application period for the 4th Heidelberg Laureate Forum (HLF). The HLF application poster and fact sheet are available for download at:

http://www.heidelberg-laureate-forum.org/download-area/ [4]

We would greatly appreciate if you could help spread the word. To this effect, please feel free to forward the attached information to all interested parties.

Also, please remember to save the date for the 4th HLF: September 18-23, 2016!

Links:

[1] mailto:ruth.wetzlar@heidelberg-laureate-forum.org

[2] mailto:beate.spiegel@klaus-tschira-stiftung.de

[3] mailto:Andreas.Reuter@h-its.org

[4] http://www.heidelberg-laureate-forum.org/download-area/

NYHETER

ENDA ET NYTT STORT PRIMTALL

A team at the University of Central Missouri, headed by Curtis Cooper has announced, via press release from the Mersenne organization, that they have found the largest prime number ever, it is $2^{74,207,281}$ -1, it has over 22 million digits. The new record has broken the old record by approximately 5 million digits.

Cooper and his team are part of the Great Internet Mersenne Prime Search (GIMPS) collaboration, which as its name suggests, is an effort by a lot of volunteers to find ever larger prime number - or, more specifically, a particular class of prime numbers that are called Mersenne, where it is one less than a power of two. Not surprisingly, Cooper and his team also held the old record, they have actually broken the record four times. He has told the press that he was notified by an email sent by the software running on a PC that the prime number had been found. The find came after a month of number crunching on a single Intel based PC. Interestingly, the PC tried to notify Cooper and his team about the find back in September of last year, but a glitch prevented it from being sent. It was only during a maintenance cycle that the message reporting the number prime number found, was sent. The official discovery date is January 7th.

The search for new and bigger prime numbers is conducted using software developed by the GIMPS team, called prime95 - it grinds away, day after day, until a new prime number is found. And while the numbers that it finds are of interest, they no longer serve much if any practical use, the software has been used for other purposes though - it has found flaws in Intel CPUs, for example.

The new prime number has been named M74207281 - in the press release, the team says that it was "calculated by multiplying together 74,207,281 twos then subtracting one." It has already been tested and confirmed by three different independent teams running software on different machines. The find makes Cooper eligible for a $3000 award. The GIMPS group also made known their goal of winning a hundred and fifty thousand dollar award by finding a prime number with 100 million digits.

Read more at: http://phys.org/news/2016-01-largest-prime.html#jCp

TOPPFORSK-PROSJEKTER TIL MATEMATIKERE VED UIB, UIO UiS OG NTNU

Forskningsrådet og Universitetene går inn i et spleiselag som de kaller fellesløftet. I år går fellesløftet til ordningen Toppforsk som er en målrettet satsning for å sikre god, langsiktig finansiering til forskningsmiljøer som kan bli internasjonalt ledende på sitt felt.

Med prosjektet *Motivic Hopf equations* sikres **Paul Arne Østvær** og forskningsgruppen i geometri og topologi ved UiO gode år fremover.

Arealet πr^2 av en sirkel med radius r er et tidlig eksempel i matematikken på en formel som knytter sammen algebra og geometri. I prosjektet motiviske Hopf ligninger ønsker man å finne samt forstå betydningen av konstanter som er definert opp til kontinuerlige deformasjoner av geometriske objekter. Disse konstantene er universelle i en forstand som gjøres matematisk presist i fagfeltet som kalles motivisk homotopi teori. Forskningen på dette feltet er i en sterk utvikling.

Prosjektet *Waves and Nonlinear Phenomena* ved NTNU får tilsvarende støtte. Prosjektleder er **Helge Holden**, men flere andre vil delta tungt i prosjektet: Mats Ehrnstrøm, Ulrik Fjordholm, Katrin Grunert, Espen Jakobsen og Peter Lindqvist.

Toppforsk-midler tildeles også **Jan Martin Nordbotten** sitt prosjekt *Thermo-Mechanical Energy Storage*. Nordbotten er ansatt ved Universitetet i Bergen.

Endelig har **Sigbjørn Hervik** ved Universitetet i Stavanger fått toppforsk-midler på sitt prosjekt *Pseudo-Riemannian Geometry and Polynomial Curvature Invariants: Classification, Characterisation and Applications.* Forskningen til Hervik dreier seg om differensialgeometri og matematisk fysikk hvor anvendelsen er spesielt knyttet til kosmologi og generell relativitetsteori. Prosjektet har som mål å koble deler av invariant teori og pseudo-Riemannsk geometri.