INFOMAT

MARS 2024

ABELPRISEN FOR 2024 TILDELES MICHEL TALAGRAND

Michel Talagrand, Centre national de la recherche scientifique og Sorbonne Université, Paris, Frankrike er tildelt Abelprisen for 2024

"for sine grunnleggende bidrag til sannsynlighetsteori og funksjonalanalyse, med kraftfulle anvendelser innen matematisk fysikk og statistikk."

Prisen deles ut ved en høytidelig seremoni i Universitetets aula i Oslo den 21. mai 2024.

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

arnebs at math.uio.no

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

Matematisk kalender

2024

Mars:

20. ABELPRISEN 2024, ANNONSERING, Oslo
<abelprisen.no>

Mai:

21. ABELPRISUTDELING, Oslo

22. ABELFORELESNINGENE, Oslo
<abelprisen.no>

Juni:

10.-14. EQUADIFF 2024, Karlstad, Sverige
<https://www.kau.se/equadiff>

17.-21. Sommerskole, Nordfjordeid
<https://sites.google.com/view/lietheory2024/home>

Juli:

26.-29. ECM2024, Sevilla
<www.ecm2024sevilla.com>

September:

12.-13. NASJONALT MATEMATIKERMØTE 2024, Oslo
<www.uio.no/nmm24 >

Nye doktorgrader

Edvard Aksnes ved UiO forsvarte 7. mars 2024 sin avhandling *Tropical homology manifolds* for graden PhD.

Veiledere har vært Kris Shaw og Kristian Ranestad, begge UiO.

Since the early 2000s, tropical geometry has emerged as a field connecting combinatorics and algebraic geometry in novel ways. Matroids are combinatorial structures which capture and generalize multiple notions, such as independence in linear algebra, the set of forests of a graph, and algebraic independence in field theory. Moreover, the Bergman fans of matroids correspond to linear spaces in tropical geometry, and by gluing such fans together, one obtains tropical manifolds, i.e. the equivalents of smooth curves and surfaces in regular geometry.

In my thesis, I have investigated how the desirable properties of Bergman fans and tropical manifolds may be generalized. Concentrating on tropical cohomology theory, the tropical Poincaré duality property satisfied by Bergman fans led to a new notion of tropical homology manifolds. These are later shown to be critical in understanding how singular and tropical cohomology are related, and we show how they may be used to study arrangements of curves in the plane.

I hope that tropical homology manifold will continue to prove useful in investigating relations between combinatorics and geometry.

Arrangementer

Equadiff 2024

will take place in Karlstad, Sweden, June 10-14 2024

The Equadiff is a series of biennial conferences on theoretical aspects of differential equations (broadly seen) held in rotation in various countries of Western and Eastern Europe. The webpage of the 2024 event in Karlstad (Sweden) is https://www.kau.se/equadiff

Summer School: Combinatorial Hopf algebras and modern Lie theory with applications

will take place in Nordfjordeid, Norway June 17 - 21, 2024. More information about the summer school may be found here:
https://sites.google.com/view/lietheory2024/home

The 10th International Conference on Mathematical Methods for Curves and Surfaces (MMCS10)

will take place in Oslo, Norway June 26 - June 29, 2024. The conference is part of a joint French-Norwegian conference series on curves and surfaces. Further details will follow soon.

ECM2024

The 9th European Congress of Mathematics will be held 15-19 July 2024 in Sevilla (Spain). The call for satellite conference proposals is open until the end of July 2023.

NASJONALT MATEMATIKERMØTE Oslo 12.-13. september 2024

Nasjonalt matematikermøte (NMM) 2024, går av stabelen på Soria Moria i Oslo 12.-13. september 2024. Dere finner informasjon med muligheter for påmelding på nettsiden www.uio.no/nmm24 I forbindelse med påmeldingen opererer vi med «førstemann til mølla»-prinsippet.

På vegne av organisasjonskomitéen,
Erlend

Ledige stillinger

13 STIPENDIATSTILLINGER UNDER INTEGREAT-PROGRAMMET, UiO og UiT

Søknadsfrist 4. mars 2024

Integreat – Norwegian Centre for Knowledge-driven Machine Learning is a Centre of Excellence, funded by the Research Council of Norway. Integreat has two branches, one in Oslo (University of Oslo, UiO) and one in Tromsø (UiT The Arctic University of Norway).

Machine learning is the mathematical and computational engine of Artificial Intelligence (AI), and therefore it is a fundamental force of technological progress in our increasingly digital, data- and algorithm-driven world. Integreat develops theories, methods, models, and algorithms that integrate general and domain-specific knowledge with data, laying the foundations of next generation machine learning. We do this by combining the mathematical and computational cultures, and the methodologies and theories, of statistics, logic, language technology, ethics and machine learning, in new and unique ways.

Focus of Integreat is to develop ground-breaking methods and theories, and therefore solving fundamental problems in science, technology, health and society. Integreat draws on the research strengths of researchers and students from the departments of Mathematics, Informatics, Philosophy, and the Oslo Centre for Biostatistics and Epidemiology at UiO, the Norwegian Computing Centre (NR) and the ML group at UiT, with members from the departments of Physics and Technology, Mathematics and Statistics, and Computer Science.

Kunngjøringer

NOMINASJONER TIL VIGGO BRUN-PRISEN

Viggo Brun-prisen er opprettet av Norsk matematisk forening og tildeles yngre norske matematikere for fremragende forskning innen matematikk, inkludert matematiske aspekter ved informasjonsteknologi, matematisk fysikk, numerisk analyse og beregningsvitenskap. Prisen skal være en anerkjennelse for vitenskapelige bidrag på høyt internasjonalt nivå.

Prisen deles ut annethvert år, første gang ved Norsk matematisk forenings 100-årsjubileum i tilknytning til det nasjonale matematikermøtet i Bergen 13.-14. september 2018. Prisvinner mottar et diplom laget av den finske designeren Eero Astala og et pengebeløp som i 2018 var 50.000 norske kroner. Diplomet prydes av prisens logo og en figur som er tatt fra Viggo Bruns artikkel om Leibniz formel for π.

Prisvinner skal normalt være under 37 år ved begynnelsen av året for prisutdeling. Prisen skal normalt gis til én person, men kan unntaksvis deles mellom to eller flere forskere som har oppnådd fremragende resultater i fellesskap. Prisvinner må tilfredsstille minst ett av følgende krav:

- være norsk statsborger
- ha tatt en vesentlig del av sin utdanning ved et norsk lærested
- ha minst tre års ansettelse ved et norsk universitet eller en norsk høgskole.

Norsk matematisk forening oppnevner en priskomite bestående av tre fremragende forskere. Foreningen utpeker en av disse som priskomiteens leder. Oppnevningen gjelder for en periode på 4 år. Medlemmer av priskomiteen kan gjenoppnevnes en gang. Priskomiteen skal foreslå prisvinner i en innstilling til Norsk matematisk forening. Styret i Norsk matematisk forening utpeker prisvinner på grunnlag av priskomiteens innstilling. Priskomiteens medlemmer for 2024 er Eugenia Malinnikova (leder), Snorre Christiansen og Andreas Leopold Knutsen.

Tidligere prisvinnere:
2018: Rune Gjøringbø Haugseng
2020: John Christian Ottem
2022: Nina Holden

Frist for nominasjoner: **1. april 2024**. Nominasjoner sendes til < nmf@matematikkforeningen.no>

Nyheter

The Norwegian Academy of Science and Letters awards the Abel Prize 2024 to **Michel Talagrand**, Centre national de la recherche scientifique and Sorbonne Université, Paris, France

"for his groundbreaking contributions to probability theory and functional analysis, with outstanding applications in mathematical physics and statistics."

The development of probability theory was originally motivated by problems that arose in the context of gambling or assessing risks. It has now become apparent that a thorough understanding of random phenomena is essential in today´s world. For example, random algorithms underpin our weather forecast and large language models. In our quest for miniaturisation, we must consider effects like the random nature of impurities in crystals, thermal fluctuations in electric circuits, and decoherence of quantum computers. Talagrand has tackled many fundamental questions arising at the core of our mathematical description of such phenomena.

One of the threads running through Talagrand´s work is to understand geometric properties of a high-dimensional phenomenon and to crystallise this into sharp estimates with broad scopes of applicability. This led him to obtain many influential inequalities. For instance, Talagrand derived powerful quantitative results to prove the sharp threshold phenomena that aften appear in the study of phase transitions in statistical mechanics. He also obtained a useful inequality bounding the quadratic transportation cost distance between a probability measure and a Gaussian distribution by their relative entropy.

Much of Talagrand´s work concerns the geometry of stochastic processes. A classical problem going back to Kolmogorov - arising for instance when one wants to analyse regularity properties of stochastic processes - is to estimate the supremum of a large collection of correlated random variables. Building on the works of Fernique and Dudley, Talagrand developed his theory of generic chaining, which provides sharp upper and lower bounds on

the expectation of suprema of Gaussian processes. This illuminated the mysterious connection between the distance function (on the underlying index set) determined by the covariance of the process and the expectation of its supremum.

A key result in probability theory is the law of large numbers asserting that the normalised sum of independent random variables converges towards its mean. This normalised sum is therefore concentrated, using the terminology coined in the early work of Milman, or self-averaging, using physics terminology. It was gradually realised that concentration is ubiquitous, since many random variables defined as functions of a large number of independent random variables appeared to be close to their mean with high probability. In an amazing tour de force, Talagrand provided quantitative versions of this phenomenon that hold in great generality, including the case of discrete random variables. This result applies to functions of independent variables that are Lipschitz with respect to the Euclidean metric and convex, yielding one of several celebrated "Talagrand inequalities."It laid the groundwork for a non-asymptotic theory of independence applicable to high-dimensional statistical problems.

Since the works of Edwards and Anderson, physicists have been fascinated by the complex behaviour exhibited by disordered systems, which describe phenomena like magnetisation in the presence of impurities, and more recently also the energy landscapes arising in machine learning. In 1980, Parisi (Nobel Prize in Physics, 2021) proposed an expression for the free energy of one of the simplest models of this type, namely the Sherrington-Kirkpatrick model. Guerra showed rigorously that this formula is an upper bound for the free energy. In a groundbreaking article, Talagrand proved the complementary lower bound, hence completing the proof of the Parisi formula. This provided the foundation for the development of a mathematical theory of spin glasses and its applications in statistical learning.

Talagrand also obtained a rich variety of important results in measure theory and functional analysis. To cite only the most recent one, he answered a longstanding question by von Neumann and Maharam in the negative by showing that there exist submeasures which are exhaustive, but are not absolutely continuous with respect to any finitely additive measure. This fact implies the existence of radically new Boolean algebras.

Talagrand is an exceptionally prolific mathematician whose work has transformed probability theory, functional analysis, and statistics. His research is characterised by a desire to understand interesting problems at their most fundamental level, building new mathematical theories along the way. He disseminated many of his insights in the form of very influential research monographs. Combining technical virtuosity with deep analytical and geometric insights to construct new powerful tools and answer longstanding hard questions, Michel Talagrand has had and continues to have an enormous impact on mathematics and its applications.

FINALE I ABEL-KONKURRANSEN

David Strømme Eikeland, Sandnes videregående skole, utkonkurrerte nesten 3200 deltagere fra de innledende rundene og 19 andre finalister i en av de gjeveste matematikk-konkurransene i Norge. Han har deltatt i Abelkonkurransen fire ganger tidligere, første gang i 2020, da han mottok utfordrerprisen. I 2021 kom han på tredje plass, i 2022 på fjerde plass og i 2023 på tredjeplass.

David vant årets finale overlegent med sine 33 av 40 mulige poeng. Andreplass gikk til Aksel Løvholt fra Oslo katedralskole med 22 poeng. Ivar Lee Fevang fra Thora Storm videregående skole kom på tredjeplass med 19 poeng. Fjerdeplass gikk til Torstein Barvik Molstad med 16 poeng, og Magnus Flydal Jenstad fikk femteplass med 14 poeng. Vebjørn Holm-Gjerde og Justin Jia var jevngode og fikk delt sjetteplass med 13 poeng.

Det var kunnskapsminister Kari Nessa Nordtun som delte ut premiene i årets Abelkonkurranse.

– *Dere har en ekstra imponert kunnskapsminister foran dere. Matematikk er en stor del av livene våre, og vi trenger dere unge som brenner for realfagene og matematikken. Dere er gode rollemodeller, og beviset på at matte kan være gøy,* sa Kari Nessa Nordtun i sin tale til finalistene.