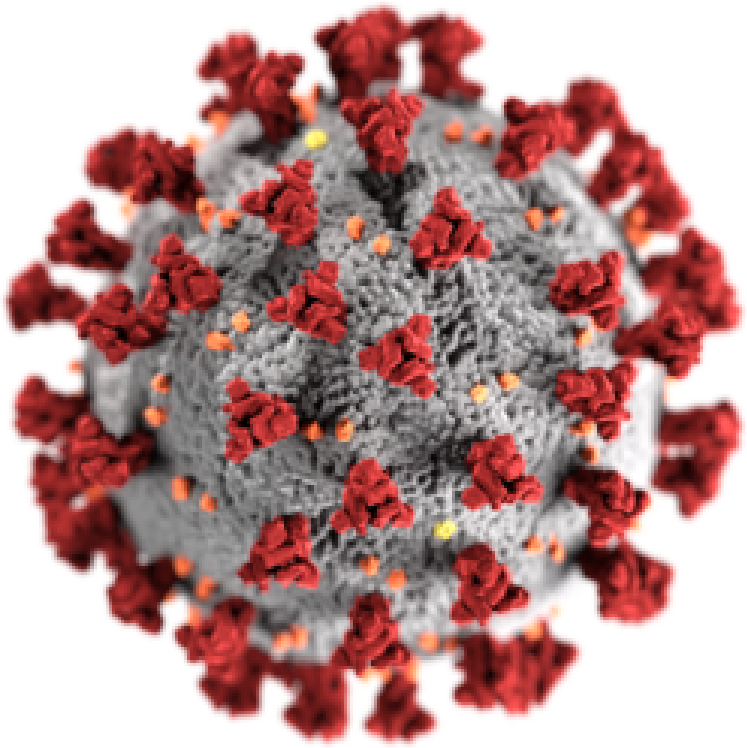
INFOMAT

NOVEMBER 2024



Lengter tilbake til pandemien? Norsk (matematikk-)artikkel om beregning av R-tallet:
https://www.liebertpub.com/doi/epub/10.1089/cmb.2023.0414

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

2025

Januar:

13.-17. QUANTUM GROUPS, TENSOR CATEGORIES AND QUANTUM FIELD THEORY, Oslo
<https://www.mn.uio.no/math/english/research/groups/operator-algebras/events/conferences/qg-2025/index.html>

Mars:

3.-7. GEOMETRIC ANALYSIS, winter school, Geilo
<https://sites.google.com/view/geilo2025-geometric-analysis/home>

Mai:

26.-30. TiME 2025, INVARIANT THEORY, Tromsø
<https://sites.google.com/view/time-2025-invariant-theory/home?authuser=0>

Juni:

9.-13. CLUSTER GEOMETRY, summer school, Nordfjordeid
<https://www.mn.uio.no/math/english/research/groups/algebra/events/conferences/nordfjordeid2025/index.html>

Arrangementer

QUANTUM GROUPS, TENSOR CATEGORIES AND QUANTUM FIELD THEORY, Oslo, 13.-17. januar 2025

Quantum field theory has been for a long time a big driving force in many areas of mathematics. In particular, it stimulated a fruitful study of mathematical structures that can represent many-body quantum mechanical systems, such as quantized universal enveloping algebras, inclusions of operator algebras and tensor categorical structures governing them, which are also interesting for their own sake. This workshop aims to bring together international experts on these topics, stimulate further exchanges of research ideas, and give an opportunity for young members of our research community to be exposed to the rapidly evolving research at the top level.

David Jaklitsch, Sergey Neshveyev and Makoto Yamashita

GEOMETRIC ANALYSIS, Geilo, 3.-7. mars 2025

We would like to invite you to our winter school, **Geometric Analysis**, 3rd - 7th of March in Geilo. Registration is now open at:
https://sites.google.com/view/geilo2025-geometric-analysis/home
Everyone is welcome to register, and we especially encourage Norwegian master and Ph.D. students to participate. The deadline for registration is **January 19, 2025.**

The school will be devoted to selected topics in analysis, geometry, and differential equations. The main lecturers are:

Sean Curry (Oklahoma, USA)
Sigmund Selberg (Bergen, Norway)
Francisco Torres de Lizaur (Seville, Spain)
Enrico Le Donne (Fribourg, Switzerland) (to be confirmed)

The winter school is supported by the project Pure Mathematics in Norway, funded by the Trond Mohn Foundation and Tromsø Research Foundation.

CLUSTER GEOMETRY, Nordfjordeid Summer School, Sophus Lie Conference Centre, Nordfjordeid, 9.-13. juni 2025

The aim of the summer school is to provide an introduction to cluster algebras and their connection to various aspects of algebraic geometry. The school is aimed at PhD students (as well as advanced master students and early postdocs) with a general background in algebra, and with interests in algebra, geometry or topology. There will be three lecture series and extensive problem sessions.

Lecturers:
Tom Bridgeland (Sheffield)
Sergey Fomin (Michigan)
Bernhard Keller (Université Paris Cité)
Lauren K. Williams (Harvard)

Practical Information:

Arrival date: Sunday 8 June
Departure date: Friday 13 June or Saturday 14 June (the school will end on Friday around noon)
Price of stay at Sophus Lie Center (per person per day, meals included): double room 1025 NOK, single room 1250 NOK For questions about the school, contact any member of the organising committee listed below.

Organizing Committee:
Martin Gulbrandsen (Stavanger),
Jørgen Vold Rennemo (Oslo),
Helge Ruddat (Stavanger)

TiME 2025, INVARIANT THEORY from classics to modern developments, Lie-Størmer Center,
Tromsø, 26.-30. mai 2025

A graduate school on the shoulders of Cayley and Sylvester. The school will provide a multifaceted viewpoint on the theory of invariants, tracing its origin to the pioneering works of Cayley and Sylvester, connecting the theory of XIX century and its development through computational algebra, modern algebraic geometry, and applications to other applied sciences.

The acronym TiME stands for Treasures in Mathematical Encounters. The first TiME event took place in 2019 in Levico (Trento, Italy) and it focused on Curves and Surfaces.

We will have 4 mini-courses exploring the connections between the questions that interested mathematicians in the past and how these theories evolved in contemporary mathematics and their applications.
Giorgio Ottaviani (U. Firenze, Italy): *Classical Invariant Theory*
Harm Derksen (Notheastern U., USA): *Computational Invariant Theory*
Kristin DeVleming (UC San Diego, USA): *Geometric Invariant Theory*
Michael Walter (Ruhr U. Bochum, Germany): *Invariant Theory in Applications*

For any questions, please contact us at time2025invariant@gmail.com

Organizers:
Kathlén Kohn (KTH, Sweden)
Alessandro Oneto (U. Trento, Italy)
Pierpaola Santarsiero (U. Bologna, Italy)
Ettore Teixeira Turatti (UiT, Norway)

Nye doktorgrader

Arne Lien ved UiT forsvarte 18. september 2024 sin avhandling *Slicing orbit Spaces, Geometry and combinatorics of hyperbolic and even-hyperbolic slices* for graden PhD.

Veiledere har vært Claus Scheiderer, Universität Konstanz og Cordian Riener, UiT.

Sammendrag:

Motivated by a connection to Timofte´s degree and halfdegree principle we study canonical hyperbolic slices, that is, sets of univariate hyperbolic polynomials that share the same first few coefficients. We study the geometric and combinatorial properties of a natural stratification of these slices and use these properties to improve upon the degree principle. Amongst the geometric properties we establish is a description of the dimension and relative interior of the strata along with a characterisation of some natural points of *escapes* from these strata. And on the combinatorial side we show that the lattice of strata is determined by the zero-dimensional strata and that the boundary complex of the dual lattice is generically a combinatorial sphere. We finish by showing that a similar story can be told about a natural stratification of even-hyperbolic slices. These are the subsets of hyperbolic slices consisting of the polynomials with only nonnegative roots and such sets arise in the context of the degree principle for the hyperoctahedral group.

Robin Schabert ved UiT forsvarte 20. september 2024 sin avhandling *Combinatorics and semi-algebraic geometry of orbit spaces* for graden PhD.

Veiledere har vært Philippe Moustrou, Université Toulouse Jean Jaures, og og Cordian Riener, UiT.

Sammendrag:

Algebraic geometry studies the set of common zeros of a system of polynomials in one or several variables - most commonly over algebraically closed fields. Real algebraic geometry studies sets defined by a finite system of polynomial inequalities.

A starting point for modern real algebraic geometry can be traced back to Hilbert: In 1888, Hilbert showed the existence of nonnegative polynomials which are not sums of squares of polynomials. In 1900, he posed his famous 23 problems and, in particular, the

17th can be stated as follows: Is every nonnegative polynomial a sum of squares of rational functions?

Artin's solution to Hilbert´s 17th problem can be seen as a kick-off for real algebraic geometry. This thesis deals with real symmetric polynomials and the results are closely related to an answer of Hilbert's 17th problem for symmetric polynomials: A characterization of all symmetric nonnegative polynomials.

Luca Gazdag ved UiO forsvarte 15. november 2024 sin avhandling *Computability theory for deep learning and matrix optimization* for graden PhD.

Veiledere har vært Professor Nadia S. Larsen, UiO, Professor Anders C. Hansen, University of Cambridge.

Sammendrag:

Computability theory is a branch of mathematics and theoretical computer science that seeks to answer questions about existence of algorithms. More specifically, suppose we are given a computational problem that we wish to solve with a computer. This can, for example, be finding the zeros of a real valued function using Newton´s method, or training a neural network to classify images. From the standpoint of computability theory one then wishes to answer the following question: For a given input class, can I compute a solution for each input? We say that a problem is non-computable if the answer to the question above is «no». This thesis is a collection of three papers that each study the computability theory of some applied problems. More specifically, two of the papers are concerned with the limitations of artificial intelligence, the computability theory of deep learning methods, and the prevalence of non-computable problems in deep learning. In these papers we specifically focus on the application of deep learning in inverse problems. In the remaining paper, we study the computability theory of semi-definite programs and we focus on the special case of nuclear norm minimization.

Kunngjøringer

HEIDELBERG LAUREATE FORUM

Dear mathematician,

Give outstanding candidates the possibility to attend the 12th Heidelberg Laureate Forum (HLF)taking place September 14 –19, 2025 in Heidelberg, Germany!

The HLF is an annual scientific networking conference, which connects promising young researchers in mathematics and computer science with the top scientists in their fields. 200 carefully selected young researchers are invited to spend a week interacting with the recipients of the Abel Prize, ACM A.M. Turing Award, ACM Prize in Computing, Fields Medal, IMU Abacus Medal and the Nevanlinna Prize. Distinguished pioneers of mathematics and computer science network with the brightest minds of the next generation in a unique atmosphere. For impressions of the conference take a look at:

https://www.youtube.com/user/LaureateForum

The deadline for recommendations is **January 19, 2025**

For more information, please see the FAQ section on our website or contact our Young Researchers Relations department: yr@heidelberg-laureate-forum.org.

Kindest regards,
Young Researchers Relations

NOMINASJONER TIL HOLMBOE-PRISEN