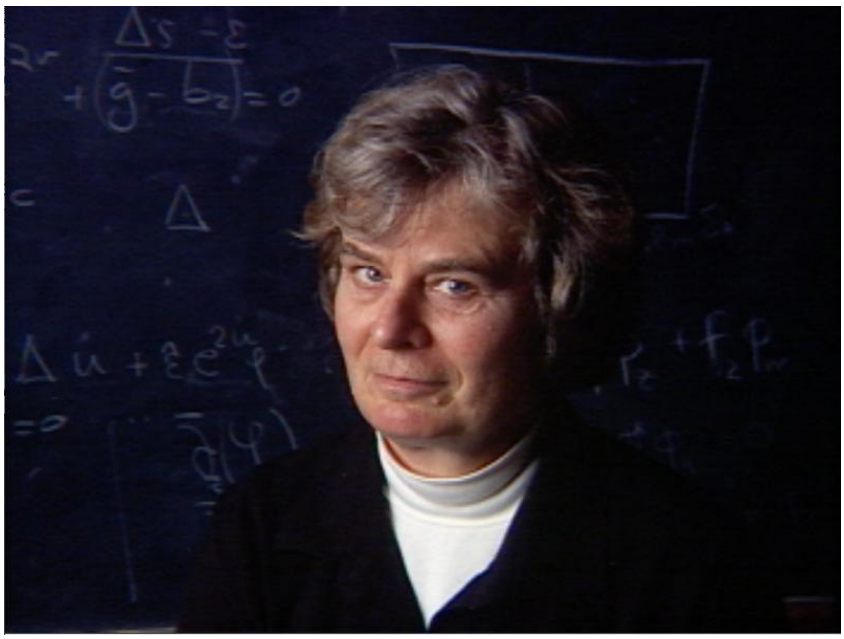
INFOMAT

Mars 2019

KAREN UHLENBECK ER ÅRETS ABELPRISVINNER



"for her pioneering achievements in geometric partial differential equations, gauge theory and integrable systems, and for the fundamental impact of her work on analysis, geometry and mathematical physics."

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.

ARRANGEMENTER

Matematisk kalender

2019:
Mars:
19. *Offentliggjøring av Abelprisen for 2019,* Oslo
Mai:
20.-22. *Abelprisutdeling*, Oslo
August:
5.-7. *Nordisk konferanse i kombinatorikk,* København

DEN 13. NORDISKE KONFERANSEN I KOMBINATORIKK, København, 5.-7. august

https://norcom2019.math.aau.dk

Dette er en konferanse i en serie, der det er en konferanse hvert tredje år. Temaer er kombinatorikk, kodeteori, diskret matematikk. Plenumsforedrag ved **Kathie Cameron, Jack Edmonds** og **Olav Geil.**

Utlysninger

ABELSTIPEND 2019/2020

Hvert år deler Norsk Matematisk Forening ut Abelstipend til studenter opptatt ved masterprogram i matematiske fag ved norske læresteder. Stipendet har som formål å stimulere lovende studenter til videre studier og forskning i matematiske fag, ved å dekke utgifter i forbindelse med kortere/lengre opphold ved et utenlandsk lærested.

Søknadsfristen er ***15. april***, og det kan da søkes om midler for studieåret 2019/2020. Søknad sendes til nmf@matematikkforeningen.no. For mer informasjon, se https://web.matematikkforeningen.no/aktiviteter/

EUROPEAN MATHEMATICAL SOCIETY

Norsk Matematisk Forening oppfordrer sterkt alle sine medlemmer om å melde seg inn i European Mathematical Society. Som medlem av NMF får man rabatt på årsmedlemskapet i EMS. Innmelding og betaling av årsmedlemskap skjer på

http://www.euro-math-soc.eu/ems_payment_new/ems_payment_new.html

SURVEY BY THE EMS EDUCATION COMMITTEE

Dear Presidents,
Student transition from school-level mathematics to university-level mathematics, often referred to as the secondary-tertiary transition (STT) is an enduring, complicated and multi-faceted process. STT is a long-standing issue of concern, which has merited significant attention in mathematics education research and practice. At its 2018 meeting in Cyprus, the EMS Education Committee recognized
that our knowledge about successful ways of dealing with STT is still insufficient and that moving forward requires a large-scope effort on the part of all parties involved, including mathematics lecturers, school teachers, education researchers, policymakers and students in transition. As part of this effort, the Committee is conducting a survey among mathematicians. The goal of the survey is to collect
and report to the mathematics community information needed in order to devise national and international actions that can essentially improve the state of the art with respect to STT.
We would be thankful to you if you distributed the survey below among the members of your national mathematical society. The completion of the survey takes about 15 minutes. The survey is open until ***September 15, 2019.***

https://docs.google.com/forms/d/e/1FAIpQLSdcxoDW63m1h7nmdacQkhtWS8cGHH84K4a8OU-fWVnqIEuGJA/viewform

For more background information about STT, we refer to
http://euro-math-soc.eu/sites/default/files/STT-survey-%2015-02-2019.pdf

With kind regards,
Volker Mehrmann,President of the EMS

HAR DU ET EKSEMPLAR AV PROCEEDINGS FRA ICM I OSLO 1936?

IMU ønsker å komplettere sitt arkiv av fysiske eksemplarer av proceedings fra de internasjonale kongressene, og skriver:

As you know, the IMU Archive is located in the IMU Secretariat in Berlin. It is our goal to collect all IMU related material in the IMU Archive. While we have scanned copies of all proceedings of all the ICMs starting from 1893, we do not possess all hardcopies of all proceedings.
Thus we would like to inquire our members if you have a physical copy of the proceedings of some of the early ICMs, and if you would be willing to donate them to us. We can cover the shipping expenses.
The missing proceedings are:

1893 Chicago
1893 The Evanston Colloquium
1897 Zurich
1900 Paris
1904 Heidelberg
1912 Cambridge (UK)
1920 Strasbourg
1924 Toronto
1928 Bologna
1932 Zurich
1936 Oslo
1962 Stockholm [vols. 2-4 missing]
1966 Moscow [vols. 2-4 missing]

For further inquires, please contact the IMU Archivist, Ms Birgit Seeliger <archivist@mathunion.org>. Scanned copies of all ICM proceedings can be found at https://www.mathunion.org/icm/proceedings
Thank you for your help in this matter.

OLA BRATTELI AND HIS DIAGRAMS

https://arxiv.org/abs/1903.01524

This article discusses the life and work of Professor Ola Bratteli (1946--2015). Family, fellow students, his advisor, colleagues and coworkers review aspects of his life and his outstanding mathematical accomplishments.

Hilsen
Magnus Landstad

Nyheter

ANDREAS ALBERG, OSLO KATEDRALSKOLE, VANT ABELKONKURRANSEN

– Laginnsatsen var veldig god i år, det var jo bare to poeng som skilte oss tre i toppen. Resultatet er noe av det sterkeste i finalen noen sinne, nå har jeg tro på at vi skal greie å hevde oss i OL, sier vinner Andreas Alberg, som også vant Abelkonkurransen i fjor.
Andreplassen gikk til Erik Mingjun Ma fra Trondheim katedralskole, og Thomas Thrane fra samme skole fikk tredjeplassen. Fjerdeplassen gikk til Erik Mjaanes fra Oslo International School, femteplassen til Olav Hellebust Haaland fra Fagerlia videregående skole og sjetteplassen til Jon-Magnus Rosenblad fra Valler videregående skole.
PGS Utfordrerprisen gikk til den unge lovende Zejia He fra Oslo International School. Hennes lave alder og solide resultater gjør at hun er en kandidat som har potensialet og kunnskapen til å vinne Abelkonkurransen om noen år.
Resultatene:

1. Andreas Alberg, Oslo,	40p
2. Erik Mingjun Ma, Trondheim,	39p
3. Thomas Thrane, Trondheim	38p

ABELPRISEN 2019 TIL KAREN UHLENBECK

Karen Keskulla Uhlenbeck is a founder of modern Geometric Analysis. Her perspective has permeated the field and led to some of the most dramatic advances in mathematics in the last 40 years.
Geometric analysis is a field of mathematics where techniques of analysis and differential equations are weaved with the study of geometrical and topological problems. Specifically, one studies objects such as curves, surfaces, connections and fields which are critical points of functionals representing geometric quantities such as energy and volume. For example, minimal surfaces are critical points of the area and harmonic maps are critical points of the Dirichlet energy. Uhlenbeck's major contributions include foundational results on minimal surfaces and harmonic maps, Yang-Mills theory, and integrable systems.

Minimal surfaces and bubbling analysis.
An important tool in global analysis, preceding the work of Uhlenbeck, is the Palais-Smale compactness condition. This condition, inspired by earlier work of Morse, guarantees existence of minimisers of geometric functionals and is successful in the case of 1-dimensional domains, such as closed geodesics.
Uhlenbeck realised that the condition of Palais-Smale fails in the case of surfaces due to topological reasons. The papers of Uhlenbeck, coauthored with Sacks, on the energy functional for maps of surfaces into a Riemannian manifold, have been extremely influential and describe in detail what happens when the Palais-Smale condition is violated. A minimising sequence of mappings converges outside a finite set of singular points and by using rescaling arguments, they describe the behaviour near the singularities as bubbles or instantons, which are the standard solutions of the minimising map from the 2-sphere to the target manifold.
In higher dimensions, Uhlenbeck in collaboration with Schoen wrote two foundational papers on minimising harmonic maps. They gave a profound understanding of singularities of solutions of nonlinear elliptic partial differential equations. The singular set, which in the case of surfaces consists only of isolated points, is in higher dimensions replaced by a set of codimension 3.
The methods used in these revolutionary papers are now in the standard toolbox of every geometer and analyst. They have been applied with great success in many other partial differential equations and geometric contexts. In particular, the bubbling phenomenon appears in many works in partial differential equations, in the study of the Yamabe problem, in Gromov's work on pseudo-holomorphic curves, and also in physical applications of instantons, especially in string theory.

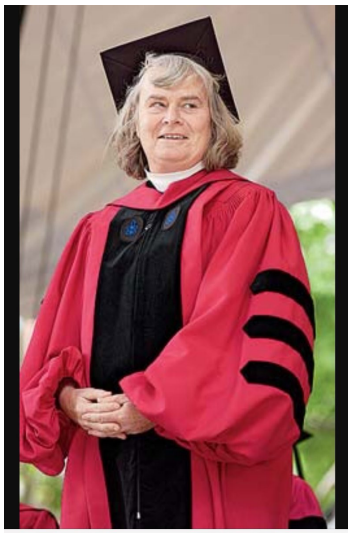
Gauge theory and Yang-Mills equations.
After hearing a talk by Atiyah in Chicago, Uhlenbeck became interested in gauge theory. She pioneered the study of Yang-Mills equations from a rigorous analytical point of view. Her work formed a base of all subsequent research in the area of gauge theory. Gauge theory involves an auxiliary vector bundle over a Riemannian manifold. The basic objects of study are connections on this vector bundle. After a choice of a trivialisation (gauge), a connection can be described by a matrix valued 1-form. Yang-Mills connections are critical points of gauge-invariant functionals. Uhlenbeck addressed and solved the fundamental question of expressing Yang-Mills equations as an elliptic system, using the so-called Coulomb gauge. This was the starting point for both Uhlenbeck's celebrated compactness theorem for connections with curvature bounded in L^p, and for her later results on removable singularities for Yang-Mills equations defined on punctured balls. The regularity theory for Yang-Mills equations in higher dimensions was carried out much later by Gang Tian and Terence Tao. Uhlenbeck's compactness theorem was crucial in non abelian Hodge theory and, in particular, in the proof of the properness of Hitchin's map and Corlette's important result on the existence of equivariant harmonic mappings.
Another major result of Uhlenbeck is her joint work with Yau on the existence of Hermitian Yang-Mills connections on stable holomorphic vector bundles over complex n-manifolds, generalising an earlier result of Donaldson on complex surfaces. This result of Donaldson-Uhlenbeck-

Yau links developments in differential geometry and algebraic geometry, and is a foundational result for applications of heterotic strings to particle physics.
Uhlenbeck's ideas laid the analytic foundations for the application of gauge theory to geometry and topology, to the important work of Taubes on the gluing of self-dual 4- manifolds, to the groundbreaking work of Donaldson on gauge theory and 4- dimensional topology, and to many other works in this area. The book of Uhlenbeck and Dan Freed on "Instantons and 4-Manifold Topology" instructed and inspired a generation of differential geometers. She continued to work in this area, and in particular had important results with Lesley Sibner and Robert Sibner.

Integrable systems and harmonic mappings.
The study of integrable systems has its roots in 19th century classical mechanics. Using the language of gauge theory, Uhlenbeck and Hitchin realised that harmonic mappings from surfaces to homogeneous spaces come in 1-dimensional parametrised families. Based on this observation, Uhlenbeck described algebraically harmonic mappings from spheres into Grasmannians relating them to an infinite dimensional integrable system and Virasoro actions. This seminal work lead to a series of further foundational papers by Uhelenbeck and Chuu-Lian Terng on the subject, and the creation of an active and fruitful school.
The impact of Karen Uhlenbeck's pivotal work goes beyond geometric analysis. A highly influential early article was devoted to the study of regularity theory of a system of non-linear elliptic equations, relevant to the study of the critical map of higher order energy functionals between Riemannian manifolds.This work extends previous results by Nash, De Giorgi and Moser on regularity of solutions of single non-linear equations to solutions of systems.
Karen Uhlenbeck's pioneering results have had fundamental impact on contemporary analysis, geometry and mathematical physics, and her ideas and leadership have transformed the mathematical landscape as a whole.

LITT OM KAREN UHLENBECK

Karen Uhlenbeck (born August 24, 1942) graduated from the University of Michigan in 1964. She received her Ph.D. from Brandeis University in 1968 with a thesis on *The Calculus of Variations and Global Analysis.* Uhlenbeck has made "pioneering contributions to global analysis and gauge theory that resulted in advances in mathematical physics and the theory of partial differential equations." She has taught at MIT, Berkeley, the University of Illinois in both Champaign-Urbana and Chicago, and since 1988 has held the Third Sid W. Richardson Foundation Regents' Chair in Mathematics at the University of Texas. She was a MacArthur Fellow in 1983, and has been elected to the American Academy of Arts and Sciences (1985) and the National Academy of Sciences (1986). On December 1, 2000, she received a National Medal of Science for "special recognition by reason of [her] outstanding contributions to knowledge" in the area of mathematics. She has also served as Vice-President of the American Mathematical Society. In 1990 she became only the second woman (after Emmy Noether in 1932) to give a Plenary Lecture at an International Congress of Mathematics.



Uhlenbeck is a co-founder of the IAS/Park City Mathematics Institute and the program for Women and Mathematics in Princeton. In 2007 she received the AMS Steele Prize for a Seminal Contribution to Mathematical Research for her foundational contributions in analytic aspects of mathematical gauge theory that appeared in two papers in the Communications in Mathematical Physics in 1982.