News in Asia Pacific Region

News from Australia

ANZIAM Applied Mathematics Conference in Hangzhou

The historic first ANZIAM conference in China, run jointly with the Zhejiang Provincial Applied Mathematics Society and in collaboration with SIAM, will be held 11–14 November 2016 in Hangzhou, China.

This region is a popular domestic tourist destination on the shore of the famous West Lake, and it contains many strong universities with students who are interested in our region. China is the nation of highest recent growth in higher education. This will be an opportunity for you to become acquainted with Zhejiang Province, along with your ANZIAM friends, in a well organised scientific and cultural event. Trans-Pacific air fares are currently of the order of $1000, affordable for many.

The conference web page has further information, along with a link to the registration page: *http://www.anziam. org.au/ZPAMS*.

Australia Day Honours for Mathematics Leader

The Australian Mathematical Sciences Institute (AMSI) congratulates Professor Gus Lehrer on his inclusion in the 2016 Australia Day honours as a member of the Order of Australia (general division). Gus was recognised for his significant service to tertiary mathematics education as an academic and researcher and his service to professional and community groups.

Gus has contributed to the institute's research program both as an event speaker and Vacation Research Scholarship project supervisor. In 2007, AMSI helped celebrate his birthday through sponsorship of the Conference on Geometry and Lie Theory.

Richly deserved, this award acknowledges a life of community service and leadership and a career that has profoundly impacted both the Australian and international mathematical sciences and helped shape future generations of mathematical leaders. An innovative scientific leader, Gus's work in the fields of algebra and geometry was also recognised with the Australian Academy of Science's 2015 Hannan Medal for research in pure mathematics.

The institute also extends congratulations all the great Australians honoured as part of Australia Day 2016 celebrations and thanks them for their outstanding service to their country and community.

Source of information: http://amsi.org.au/2016/01/27/ australia-day-honours-for-mathematics-leader/

Phil Howlett and Erhan Kozan Awarded the ASOR Ren Potts Medal

Emeritus Professor Phil Howlett (University of South Australia) and Professor Erhan Kozan (Queensland University of Technology) are the joint recipients of the 2015 Ren Potts Medal. The Australian Society for Operations Research (ASOR) awards the Ren Potts Medal for outstanding contribution to the theory and practice of Operations Research in Australia.

Phil Howlett

Emeritus Professor Phil Howlett has made a sustained and outstanding contribution to both the theory and practice of Operations Research. He has published three books and more than 100 journal papers, won approximately $6m in competitive funding from the Australian Research Council and the Rail Cooperative Research Centre and trained 13 PhD students.

Howlett led the Scheduling and Control Group at the University of South Australia (1993–2011), which invented and developed a suite of rail technology systems with Sydney-based company TTG Transportation Technology. For example, on-board driver advice system Energymiser helps trains to arrive on time while minimising energy use. It has been used around the world and has won industry awards in both Australia and the UK. With colleague Peter Pudney, Howlett

designed driving strategies for solar-powered racing cars, leading to Aurora 101 winning the 1999 World Solar Challenge.

Howlett has also made substantial contributions to the development of stochastic optimal control policies for water storage in a system of connected dams, and to generation of synthetic rainfall data. More broadly he has worked on operator approximation, signal processing and inversion of matrix and operator pencils.

Howlett has given many years of service to the Australian Mathematical Society via ANZIAM and the Mathematics-in-Industry Study Group.

Erhan Kozan

Professor Erhan Kozan is adjunct professor of operations research in the School of Mathematical Science, Queensland University of Technology and honorary professor in the Sustainable Minerals Institute, University of Queensland, Australia.

He has had over 40 years industrial, managerial, teaching and research experience in the areas of operations research. He has acted as principal investigator for over 30 long-term industrial projects, and over 20 competitive national and international research grants since 1996 in the area of health, finance, mining, car and truck production, railways, seaports transportation, logistics and supply chain.

He is the author of a book, ten software packages and over 200 journal papers and conference papers. He is the editor/associate editor of seven journals and works as a referee of over 40 international journals. He has supervised over 35 postgraduate research students.

He is the former president of the Asia Pacific Industrial Engineering and Management Society (APIEMS) and the Australian Society for Operations Research. He is an expert in disciplinary research across decision science and scheduling theory. His current research focuses on the area of healthcare process optimisation, train scheduling and mine optimisation.

Source of information: http://www.austms.org.au/tiki-read_article.php?articleId=326, http://www.asor.org.au/index.php/award-medal/asor-ren-potts-award

News from China

Hua Loo-Keng Mathematics Award 2015

The Hua Loo-Keng Mathematics Award was established by the Chinese Mathematical Society in 1991 and sponsored by Hunan Education Publishing House. Since then the awards are awarded every two years to two Chinese mathematicians who have made significant contributions in mathematical research and mathematical education. The winners of the 12th Hua Loo-Keng Mathematics Awards are Lin Qun of the Institute of Mathematics and Systems Science, Chinese Academy of Sciences and Liu Yingming of Sichuan University.

Lin's work focuses on computational mathematics and its applications. He is one of the first to propose superconvergence for integral equations, and is the first to build and clarify the extrapolation theory of the finite element method (FEM) for differential equations. Further, he gave the extrapolation, with derivative superconvergence, for discontinuous FEM for 2-dimensional hyperbolic equations. He established the lower bound theory of eigenvalues by nonconforming FEM. His results have been applied to nuclear reactor and economic computations.

Lin's earlier awards include the First Prize of Natural Sciences (Chinese Academy of Sciences) and the Bolzano Honorary Medal for Merit in the Mathematical Sciences (Academy of Sciences of the Czech Republic).

He actively popularised calculus, presenting the contents, form and techniques of mathematics to the public in a way that is easy to understand by producing pictures. He made it into the Hong Kong television drama series ("A Great Way to Care II"). He worked with others in producing lecture videos, animation lectures and electronic teaching materials. He has helped to nurture many students who have become leaders in science and education in various parts of the world, from pure mathematics to computational and scientific computing and from scientific research to scientific administration.

Source of information: http://www.cms.org.cn/cms/xhxw/20151224-1.pdf

The following writeup on the work of Liu Yingming is adapted from Sichuan University's Newsletter (Issue 13, Winter, 2015).

"The research of Liu Yingming focuses mainly on topology and the mathematical theory of fuzziness. His achievements impact the world extensively. In the area of general topology, following the work of John Milnor, a Fields medalist, he solved the well-known Whitehead problem on CW complex. His work on paracompactness has his own style. He also solved the Lawson–Mislove problem on the topological structure of domains. He pushed the theory of topology on lattices, a theory proposed by the French mathematician Ehresmann, to a new stage. He proposed the theory of quasi-coincidence and demonstrated that the principle of multiple choice is the essential ingredient in the relationship between points and sets. He obtained a series of breakthroughs and laid the foundation of the key approach to topology on lattices. In the investigation of the Dieudonné insertion problem, he introduced a new method to define a lattice-valued function, determine the level cuts instead of the value at each point. He then succeeded in extending the Dieudonné insertion theorem to the lattice-valued setting. He is a representative figure in the algebraic approach to fuzzy topology. He has done deep work on a series of topics, including uniformity and metrisation, embedding theory, join-preserving maps, minimal sets, continuous lattices, semicontinuous functions, domain theory and category theory. In disposition of fuzziness, the solutions of the Hilbert Problem 13 and the Kolmogorov representation are the basis of the current theory of neural networks, Liu Yingming, together with his collaborator, obtained a succinct representation of an important class of application-oriented functions. This representation lowers dimensions and is of vital importance."

Liu has been deeply involved with projects related to the processing of fuzzy information and the promotion of fuzzy technology in industry. He is a Fellow of IFSA (International Fuzzy System Association).

Source of information: http://global.scu.edu.cn/ ?newsletter

S S Chern Mathematics Award 2015

In memory of the great geometer S S Chern and in recognition of his efforts to the development of mathematics and young mathematicians in China, the Chinese Mathematical Society established a Chern Shiing Shern Mathematics Award to be awarded every two years. In 2015 it was awarded to CHEN Zhiming of the Institute of Computational Mathematics, Academy of Mathematics and System Sciences, Chinese Academy of Sciences and to FU Jixiang of the Institute of Mathematics of Fudan University.

Chen Zhiming's previous awards included China NSF Outstanding Young Scientist Grant, Feng Kang Prize for Scientific Computing and National Natural Science Prize (Class 2). Chen has made advances in the theory and algorithms of the finite element method in computational mathematics. His results have found applications in engineering and material science. He developed, with Wu Haiqun, a finite element adaptive strategy with error control for the wave scattering by periodic structures, thereby solving the problem of determining PML (perfectly matched layer) parameters. In joint work with Xiang Xueshuang, Chen proposed and proved the convergence of a source transfer domain decomposition method for Helmholtz equations in unbounded domains. He and R H Nochetto derived *a posteriori* error estimators of residual type for piecewise linear finite element approximations to elliptic obstacle problems. With Jia Feng, he gave an adaptive finite element method with reliable and efficient error control for linear parabolic problems. He and Thomas Hou proposed a mixed multiscale finite element method for elliptic problems with oscillating coefficients. With Ji Guanghua, he derived Sharp L^1 *a posteriori* error estimates for initial boundary value problems of nonlinear convection-diffusion problems which display both parabolic and hyperbolic behaviour, with the error estimates having the correct convergence order in the region where the solution is smooth. Chen and Yue Xinye developed a multiscale coarse grid algorithm to solve steady flow problem involving well singularities in heterogeneous porous medium based on the multiscale finite element, where the additional well singularities of the problem were resolved locally by adding finite element base functions.

Fu Jixiang made important contributions to complex geometry and the development of non-Kahler complex manifolds. Strominger had proposed, in 1986, a system of equations for supersymmetric compactification in heterotic string theory. It was not until some 20 years later that a breakthrough in superstring theory was made by Fu and Yau Shing-Tung who jointly constructed a smooth solution of the Strominger system for a class of non-Kahler Calabi–Yau three folds and gave a lower bound for the volume estimate of a class of nonlinear Monge–Ampere equations. Fu made further ground-breaking advances in joint work with Li Jun and Yau on the construction of balanced metrics on some non-Kahler manifolds, in particular on the connected sum of k copies of $S^3 \times S^3$ for $k \geq 2$.

Source of information: http://www.cms.org.cn/cms/xhxw/20151224-2.pdf

Xu Shanjia Becomes IEEE Life Fellow

According to the latest information from Institute of Electrical and Electronics Engineers (IEEE), XU Shanjia of the University of Science and Technology of China (USTC) is promoted as IEEE Life Fellow, which makes him the first IEEE Life Fellow in both USTC and Anhui Province.

IEEE Life Fellow is title conferred to those IEEE Fellows who age over 65 and contribute to the Institute over long years and thus have a sum of age and membership over 100. Prof XU Shanjia was previously elected IEEE Fellow in 2008 due to his contribution in Dielectric Waveguiding Structure.

The IEEE is the world's largest professional association advancing innovation and technological excellence for the benefit of humanity. It publishes a third of the world's technical literature in electrical engineering, computer science and electronics and is a leading developer of international standards that underpin many of today's telecommunications, information technology and power generation products and services. IEEE is the trusted "voice" for engineering, computing and technology information around the globe. There are more than 430,000 IEEE members in more than 160 countries.

XU Shanjia graduated from USTC in 1965 and has been working in USTC since then. He had served successively as vice dean of School of High Technology, dean of Department of Electronics Engineering and Information Science, deputy director of USTC Academic Committee. He has also been serving as vice chair of China Microwave Society, board of Anhui Academic Degrees Committee, and editor of a series of IEEE transactions and journals. Prof XU has been long engaged in teaching and research in the field of microwave, millimeter-wave, and light wave theories and technologies. He has been receiving the government special allowance since 1992, and was entitled "National Model Teacher" by Ministry of Education in 2001. Prof XU has won many academic awards including a first prize of CAS Nature Science Award. He has published over 560 papers at academic journals home and abroad.

Source of information: http://en.ustc.edu.cn/news/201512/t20151231_234614.html

News from Hong Kong

Gerd Faltings and Henryk Iwaniec Awarded Shaw Prize in Mathematical Sciences 2015

The Shaw Prize in Mathematical Sciences 2015 is awarded to Gerd Faltings, Managing Director at Max Planck Institute for Mathematics in Bonn, Germany, and Henryk Iwaniec, New Jersey Professor of Mathematics at Rutgers University, USA, for their introduction and development of fundamental tools in number theory, allowing them as well as others to resolve some longstanding classical problems.

Number theory concerns whole numbers, prime numbers, and polynomial equations involving them. The central problems are often easy to state but extraordinarily difficult to resolve. Success, when it is achieved, relies on tools from many fields of mathematics. This is no coincidence since some of these fields were introduced in attempts to resolve classical problems in number theory. Faltings and Iwaniec have developed many of the most powerful modern tools in algebra, analysis, algebraic and arithmetic geometry, auto-

morphic forms, and the theory of zeta functions. They and others have used these tools to resolve longstanding problems in number theory.

Gerd Faltings

A polynomial equation of degree n in one variable with coefficients which are rational numbers has just n complex numbers as solutions. Such an equation has a symmetry group, its Galois group, that describes how these complex solutions are related to each other.

A polynomial equation in two variables with rational coefficients has infinitely many complex solutions, forming an algebraic curve. In most cases (that is, when the curve has genus 2 or more) only finitely many of these solutions are pairs of rational numbers. This well-known conjecture of Mordell had defied resolution for sixty years before Faltings proved it. His unexpected proof provided fundamental new tools in Arakelov and arithmetic geometry, as well as a proof of another fundamental finiteness theorem — the Shaferavich and Tate Conjecture — concerning polynomial equations in many variables. Later, developing a quite different method of Vojta, Faltings established a far-reaching higher dimensional finiteness theorem for rational solutions to systems of equations on Abelian Varieties (the Lang Conjectures). In order to study rational solutions of polynomial equations by geometry, one needs arithmetic versions of the tools of complex geometry. One such tool is Hodge theory. Faltings' foundational contributions to Hodge theory over the p-adic numbers, as well as his introduction of other related novel and powerful techniques, are at the core of some of the recent advances connecting Galois groups (from polynomial equations in one or more variables) and the modern theory of automorphic forms (a vast generalisation of the theory of periodic functions). The recent striking work of Peter Scholze concerning Galois representations is a good example of the power of these techniques.

Henryk Iwaniec

Iwaniec's work concerns the analytic side of diophantine analysis, where the goal is usually to prove that equations do have integral or prime solutions, and ideally to estimate how many there are up to a given size.

One of the oldest techniques for finding primes is sieve theory, originating in Erastosthenes' description of how to list the prime numbers. Iwaniec's foundational works and breakthroughs in sieve theory and its applications form a large part of this active area of mathematics. His proof (with John Friedlander) that there are infinitely many primes of the form X^2+Y^4 is one of the most striking results about prime numbers known; the techniques introduced to prove it are the basis of many further works. The theory of Riemann's zeta function — and more generally of L-functions associated with automorphic forms — plays a central role in the study of prime numbers and diophantine equations. Iwaniec invented many of the powerful techniques for studying L-functions of automorphic forms, which are used widely today. Specifically, his techniques to estimate the Fourier coefficients of modular forms of half-integral weight and for estimating L-functions on their critical lines (the latter jointly with William Duke and John Friedlander) have led to the solution of a number of longstanding problems in number theory, including one of Hilbert's problems: that quadratic equations in integers (in three or more variables) can always be solved unless there is an "obvious" reason that they cannot.

In a series of papers remarkable both in terms of its concept and novel techniques, Iwaniec together with different authors (Ètienne Fouvry and then Enrico Bombieri and John Friedlander) established results about the distribution of primes in arithmetic progressions which go beyond the notorious Riemann Hypothesis. This opened the door to some potentially very striking applications. Yitang Zhang's much celebrated recent result on bounded gaps between primes relies heavily on the works of Iwaniec *et al.* Iwaniec's work mentioned above, together with his many other technically brilliant works, have a central position in modern analytic number theory.

Source of information: http://www.shawprize.org/en/ shaw.php?tmp=3&twoid=98&threeid=245&fourid=446

News from Japan

MSJ Autumn Meeting 2015

The MSJ Autumn Meeting 2015 was held from 13 to 16 September at Kyoto Sangyo University, Kyoto City. The Chair of the Organising Committee was Dr MURASE, Atsushi, and the chair of Executive Committee was Dr MASAOKA, Hiroaki.

The MSJ Spring and Autumn Meetings are the most important activities of the MSJ. They help the members communicate scholarly information and play a crucial role in the development of Mathematics in Japan.

In the Autumn Meeting 2015, the 10 Research Sections of the MSJ organised 31 invited talks and 445 short communications of research papers. Furthermore 7 featured invited lectures, which are organised independently of research sections, were delivered in order to promote interdisciplinary researches. There were two plenary lectures:

"Group actions on quasi-trees and quasi-morphisms" by Dr FUJIWARA, Koji, Professor at Department of Mathematics, Kyoto University and "Difficulties arising in mathematical fluid mechanics" by Dr OKAMOTO, Hisashi, Professor at RIMS, Kyoto University.

The MSJ prize presentation ceremony was held on 14 September. The 2015 MSJ Autumn Prize was awarded to Dr FUJIWARA, Koji, Professor at Department of Mathematics, Kyoto University. The 2015 MSJ Takebe Katahiro Prizes, which are awarded to encourage young mathematicians, were presented as well.

On 12 September, the MSJ celebrated the centennial anniversary of the birth of Dr Kiyosi Itô, one of the founders of modern probability theory, by organising a featured open lecture for citizens and a panel discussion at Kyoto Sangyo University. Dr WATANABE, Shinzo's lecture entitled "Kiyosi Itô and His Mathematics" was followed by a discussion among five panelists (Dr IKEDA, Nobuyuki, Dr KUNITA, Hiroshi, Dr KUSUOKA, Shigeo, Dr NISHIO, Makiko and Dr SUGITA, Hiroshi). The MSJ also set up a memorial photo gallery from 12 September through 16 September at Kyoto Sangyo University.

The 2015 MSJ Analysis Prize

The 2015 MSJ Analysis Prize was awarded to the following members of the MSJ. Dr SUGIMOTO, Mitsuru, Professor at Graduate School of Mathematics, Nagoya University was recognised by his contributions to "Harmonic analysis for modulation and related spaces and smoothing estimates for partial differential equations of dispersive type". Dr TANAKA, Kazunaga, Professor at School of Fundamental Science and Engineering, Waseda University was recognised by his contributions to "Variational method for multi-cluster solutions to a singular perturbation of nonlinear elliptic equations". Dr TAKEMURA, Akimichi, Professor at Graduate School of Information Science and Technology, the University of Tokyo was recognised by his "Studies on holonomic gradient method".

The 2015 MSJ Geometry Prize

The 2015 MSJ Geometry Prize is awarded to the following awardee. Dr IRITANI, Hiroshi, Associate Professor at Department of Mathematics, Kyoto University, was recognised by "Study of Quantum Cohomology" and Dr. SAEKI, Osamu, Professor at Institute of Mathematics for Industry, Kyushu University, by "Stable maps and Topology of Manifolds".

The 16th Takagi Lectures

The 16th Takagi Lectures were held on 28 and 29 November, 2015 at the University of Tokyo, Japan. It was organised to commemorate the centennial anniversary of the birth of Dr Kunihiko Kodaira, one of the giants of the 20th century mathematics. The Mathematical Society of Japan received the following excellent Takagi Lectures: "Kodaira Fibrations and Beyond: Methods for Moduli Theory" by Dr Fabrizio Catanese at Universität Bayreuth, "Recent Progress towards the Kobayashi and Green–Griffiths–Lang Conjectures" by Dr Jean-Pierre Demailly at Université de Grenoble I, "Riemann–Hilbert Correspondence for Holonomic D-modules" by Dr Masaki Kashiwara at RIMS, Kyoto University and "From Riemann and Kodaira to Modern Developments on Complex Manifolds" by Dr Shing-Tung Yau at Harvard University.

The MSJ Spring Meeting 2016

The MSJ Spring Meeting 2016 will be organised at Tsukuba University in Ibaraki Prefecture during the

period March 16–19, 2016. The Chairs of the Organising Committee and the Executive Committee are Dr ISOZAKI, Hiroshi and Dr TSUBOI, Akito, respectively. The official webpage of the meeting is: *http://mathsoc.jp/en/meeting/tsukuba16mar/*

The 9th MSJ-SI "Operator Algebras and Mathematical Physics"

The 9th Mathematical Society of Japan, Seasonal Institute (MSJ-SI) will be held at Tohoku University, Sendai City, Japan, during the period from 1 August through 12 August, 2016. The Seasonal Institute is organised on the occasion of the 60th anniversary of Sakai's characterisation for W^*-algebras. It consists of a summer school (1–5 August, 2016) for graduate students and an international conference (8–12 August, 2016) for researchers.

The official webpage of the 9th MSJ-SI is: *http://www.ms.u-tokyo.ac.jp/~yasuyuki/msj-si2016.htm*

News from Korea

South Korea Team Wins 4th Place in the 2016 Romanian Master of Mathematics Competition

A team of high school students from South Korea won fourth place in the 2016 Romania Master of Mathematics (RMM) with 5 silver medals. RMM is well-known to be one of the most challenging international high school mathematics competitions in the world.

The eighth edition of RMM was held in Bucharest between 24th February and 29th February. The actual test took two days (Feb 26th–27th), and the marking took another two days (Feb 27th–28th).

It was the first time for South Korea to compete in RMM, and they won fourth place with team score 65, which was given by the sum of the top three contestants in the team. In addition, the team members achieved 5 silver medals.

The First Young Mathematician Camp 2016

KMS and NIMS held the first "Young Mathematician Camp (YMC)" at the Center for Applications of Mathematical Principles (CAMP) from January 4th to 7th, 2016. YMC was designed for normal high school students, instead of science high school students, to

illustrate natural and socialistic phenomena through mathematics and let them be proud of enjoying mathematics. 50 high school students were selected, and a college assistant was assigned for each 5 high school students. Starting with the keynote speech by Professor Younghoon Kim of Seoul National University on the first day (January 4th), we had Combinatorics day on the second day (January 5th) and Geometry day on the third day (January 6th). Each day we had variety of collaborative assignments and activities. Every expense including the accommodation (Yuseong Intercity hotel) and the membership fee was free for participants.

2016 Global KMS International Conference in Celebration of Its 70th Anniversary

Founded in 1946, Korean Mathematics Society now reached its 70th anniversary and is hosting an international conference in celebration of the anniversary at Seoul National University.

> Date: October 20–23, 2016
> Place: Seoul National University

Professor Hyeonbae Kang Awarded the 11th Kyung-Ahm Academic Award in Natural Science

Prof. Hyeonbae Kang (Inha University, Professor of Mathematics) was chosen as the winner in natural science part of the 11th Kyung-Ahm Academic Award of the Kyung-Ahm Education & Culture Foundation. Recognised as one of the best applied mathematician in Korea for his remarkable achievements in inverse problems and imaging, Prof. Kang proved 60-year old problem of equivalences of two conjectures — Polya–Szego conjecture and Eshelby conjecture — and resolved both of them to be true, leading the world's applied mathematics.

The Kyung-Ahm Academic Award is awarded by Kyung-Ahm Education & Culture Foundation, established on a 100 billion KRW (approx. $100 million) contribution from Chairman Song, Geum-jo of the Taeyang Group based in Busan. The award ceremony was held in Nurimaru APEC house in Busan on November 6, 2015, where each winner was awarded 200 million KRW and a plaque.

Professor Sung Yeon Kim Wins '2015 Woman Scientist & Engineer of the Year' Award

Professor Sung Yeon Kim of Center for Mathematical

Challenges, Korea Institute for Advance Study (CMC, KIAS) is awarded with '2015 Woman Scientist & Engineer of the Year' Award in Science division by Ministry of Science, ICT and Future Planning, and National Research Foundation of Korea. She is awarded for the proof of 'the rigidity of CR maps between bounded symmetric domains'. Her research area is Several Complex Variable Analysis.

The purpose of Woman Scientist & Engineer of the Year Award is to award a woman scientist for outstanding scientific or technological work in three divisions: Science, Technology, and Promotion. The award ceremony is held at the Korea Press Foundation International Conference Room on December 22, 2015.

Seoul Culture Prize for Natural Sciences, Yongjin Song

Professor Yongjin Song (Inha University) was awarded the 64th Seoul Culture Prize for natural science in 2015, which is granted for outstanding contributions in cultural development and art promotion in Seoul. Professor Song has greatly contributed to development and enhancement of topology in Republic of Korea based on various academic activities and creative research. Also, he enhanced national prestige as the leader of a national team for International Mathematical Olympiad. The Seoul Culture Prize was established in 1948, and it has been awarded annually since 1948 except the period of Korean war and 1968. The prize ceremony take place on December 18, 2015 on 8th floor of the New building in the City Hall of Seoul.

KIAS Awarded 2015 Creative Science and Technology Award

KIAS was chosen to be the winner of Minister prize of 2015 Creative Science and Technology award, which was given by Ministry of Science, ICT, and Future Planning and National Research Foundation of Korea. Award committee chose KIAS for its leading role in theoretical basic science research. The Creative Science and Technology award has been established to promote creative idea in science and technology sector in Korea and four institutes are chosen each year for their successive role in national science technology development. Awards ceremony was held on December 22, 2015 at the international conference hall, Korea Press Center.

News from New Zealand

New Zealand Mathematical Society Awards

• NZMS Research Award

This annual award was instituted in 1990 to foster mathematical research in New Zealand and to recognise excellence in research carried out by New Zealand mathematicians.

The Research Award for 2015 was presented at the NZ Mathematics Colloquium dinner in Christchurch to Hinke Osinga of the University of Auckland for pioneering work on theory and computational methods in dynamical systems and its applications in biology and engineering.

• NZMS Early Career Award

This award was instituted in 2006 to reward early career New Zealand mathematicians.

The Early Career Award for 2015 was presented at the NZ Mathematics Colloquium dinner in Christchurch to Adam Day of Victoria University, for fundamental contributions to the theory of algorithmic randomness and computability including the solution of the random covering problem.
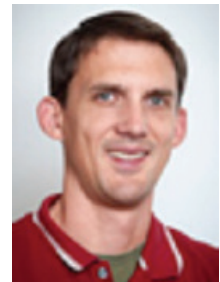
• 2015 Aitken Prize for Best Student Paper

This prize was awarded to Andrew Keane of the University of Auckland for his talk on "Bifurcation analysis of a model for the El Niño Southern Oscillation".

News from Vietnam

14th Workshop on Optimisation and Scientific Computing

The series "Workshop on Optimisation and Scientific Computing" is organised annually, starting from 2003, by the Institute of Mathematics, Vietnam Academy of Science and Technology.

Since 2005, it has been held on Mount Ba Vi, a mountain isolate situated about 50 km west of Hanoi.

This year, the 14th workshop of the series is jointly organised by the Institute of mathematics (IMH) – Vietnam Academy of Science and Technology (VAST) and the Vietnam Institute for Advanced Studies in Mathematics (VIASM) during 21–23 April, 2016, at Ba Vi. More details can be seen at
http://hpsc.iwr.uni-heidelberg.de/OptiSciCom16

IMH-SEAMS school on Algebraic Geometry

The IMH-SEAMS school on Algebraic Geometry was held at Hanoi, Vietnam during 29 February to 11 March, 2016.

This is an introductory school to Algebraic Geometry, host by the Institute of mathematics (IMH) – Vietnam Academy of Science and Technology (VAST). Organisers are Le Tuan Hoa, Phung Ho Hai, Nguyen Chu Gia Vuong, Doan Trung Cuong.

Supported by the IMH, the Centre International de Mathématiques Pures et Appliquées (CIMPA), and the South-East Asia Mathematical Society (SEAMS), the school opens for all undergraduate and graduate students.

Lecturers and tutors are Arnaud Beauville (Nice), Michel Brion (Grenoble), Nguyen Chu Gia Vuong (Hanoi), and Doan Trung Cuong (Hanoi).

There are two mini-courses, each consists of 5×90 minute lectures and 5×120 minute lectures.

There are also tutorial sessions and discussion. More details can be seen at *http://math.ac.vn/conference/seams16/*

Establishment of Two Centres in Mathematics and Physics under the Auspices of UNESCO (Category 2)

Last November, at the 38th General Conference, the United Nations Educational, Scientific and Cultural Organization (UNESCO) has approved the proposal of the Government of Vietnam on the establishment of the Centres in Mathematics and Physics, at the Vietnam Academy of Science and Technology in Hanoi, Vietnam, as a category 2 centre under the auspices of UNESCO.

The objectives of the Centre shall be to:
(a) Conduct mathematics research and training at the highest international standards;
(b) Provide an international centre for capacity building in the basic sciences, through schools and workshops;
(c) Support research in those countries in Asia-Pacific and in the least developed countries in Africa, where mathematical research is not yet well-developed;
(d) Provide expertise to decision makers, educators and the general public to strengthen the research and development potential in the region and beyond.

The functions of the Centre shall be to develop training and regional capacity-building activities with a focus on advanced training and development through scientific research, carried out by the Centre permanent staff and by short/long term visitors, in cooperation with national and international institutions and with participation in international research projects.

It is hoped that the official agreement between Vietnam Government and the UNESCO concerning the establishment of these centers will signed before the summer of 2016, and the center will start the first activities at the end of this year.

Strengthening Collaborations between Vietnamese Mathematicians and Japanese and Korean Mathematicians

In 2015–2016 the collaborations between Vietnamese mathematicians and Japanese and Korean mathematicians have increased. The host from Vietnam is the Institute of Mathematics – VAST (IMH) and the Vietnam Institute for Advanced Study in Mathematics (VIASM). Below are joint activities between Viet-

namese and Japanese mathematicians held during this period:

- International Conference and 8th Japan–Vietnam joint Seminar on Commutative Algebra, March 21–25, 2016, Ha Long, Vietnam

This is organised by Japanese and Vietnamese mathematicians since 2001. The seminar also invites leading experts from other countries to give lectures on recent developments in Commutative Algebra and related fields.

- International workshop on "Combinatorial Aspects in Commutative Algebra, Local Algebra and Representation Theory", Tuan Chau, Vietnam, December 26, 2015–January 7, 2016

- The 3rd Franco–Japanese–Vietnamese Symposium on Singularities, Hanoi, Vietnam, November 30, 2015–December 4, 2015

This is the continuation of the 1st Franco–Japanese–Vietnamese symposium on singularities, Nice September 2013 and the 2nd Franco–Japanese–Vietnamese symposium on singularities, Sapporo, August 2014.

Next are some joint activities between Vietnamese and Korean mathematicians held during this period:

- Vietnam–Korea Joint Workshop on Dynamical Systems and Applications,
Hanoi, March 2–5, 2016

- Vietnam–Korea joint meeting on Algebra,
Halong Bay, January 19–21, 2015.

I. Some Upcoming Events:

1. International Conference and 8th Japan–Vietnam joint Seminar on Commutative Algebra

Date: March 21–25, 2016

Venue/Location: Tuan Chau, Ha Long, Quang Ninh

Organisers: Nguyen Tu Cuong, Le Tuan Hoa (IMH), Ngo Viet Trung (IMH and VIASM), Shiro Goto, Yukio Nakamura (Meiji University), Ken-ichi Yoshida (Nihon University). Local Organising Committee: Doan Trung Cuong, Ha Minh Lam (IMH and VIASM), Nguyen Phu Hoang Lan (College of Sciences, Hanoi National University, Vietnam).

Purpose: This is a joint activity organised by Japanese and Vietnamese mathematicians since 2001. The aim of the seminar is to enhance the research collaborations between the two countries in the field Commutative Algebra.

Content: The seminar also invites leading experts from other countries to give lectures on recent developments in Commutative Algebra and related fields.

Organising Institutions: Institute of Mathematics – VAST (IMH) and Vietnam Institute for Advanced Study in Mathematics (VIASM).

Email: jvseminar2016@math.ac.vn

Website conference: *http://math.ac.vn/conference/jv-seminar2016*

Sponsors
Institute of mathematics, VAST, Hanoi (IM Hanoi)
Vienam Academy of Science and Technology (VAST)
Vietnam Institute for Advanced Study in Mathematics (VIASM)
The National Foundation for Science and Technology Development (NAFOSTED)

2. 14th Workshop on Optimisation and Scientific Computing

Venue, Date: Ba Vì, April 21–23, 2016

Organised by: The Vietnam Institute for Advanced Study in Mathematics and the Institute of Mathematics-Vietnam Academy of Science and Technology

Organising committee:
Phan Thành An (Chair), Phạm Kỳ Anh, Nguyễn Hữu Dư, Nguyễn Hữu Điển, Nguyễn Định, Trương Xuân Đức Hà, Đinh Nho Hào, Trần Văn Hoài, Lê Dũng Mưu, Huỳnh Văn Ngãi, Đặng Thị Oanh, Hoàng Xuân Phú, Huỳnh Thế Phùng, Tạ Duy Phượng, Nguyễn Năng Tâm, Nguyễn Xuân Tấn, Lê Quang Thủy, Nguyễn Thị Thu Thủy, Hà Huy Vui, Nguyễn Đông Yên, Lê Hải Yến.

Invited lectures:
+ Phan Quốc Khánh – National University HCM
+ Vũ Hoàng Linh – VNU Science of University
+ Vũ Ngọc Phát – Institute of Mathematics, VAST

Deadline for Registration and Abstract Submission: March 25, 2016

Contact: Organisers of OptiSciCom, Institute of Mathematics, 18 Hoang Quoc Viet Road, Cau Giay, District Hanoi

E-mail: optiscicom@math.ac.vn

Website: *http://hpsc.iwr.uni-heidelberg.de/ OptiSciCom16/organizers.php*

II. Past Events

1. VIASM Annual Meeting 2015

VIASM Annual Meeting 2015 has opened on 22 August, 2015. This annual event of VIASM is following Bourbaki seminars and this is the fourth in the Institute series (since 2012).

For the series, VIASM often invite highly reputed mathematicians to deliver lectures on central topics of contemporary mathematics. The lecturers provide the audience with most interested problems in their research fields, main ideas and main results. The lectures are published in a special issue of Acta Mathematica Vietnamica.

This year, the speakers are Henri Berestycki (CNRS/ EHESS, France), Hwang, Jun-Muk (Korea Institute for Advanced Study, Korea), Marc Levine (University Duisburg-Essen, Germany), François Loeser (University Pierre et Marie Curie, France) and Cédric Villani (Institut Henri Poincaré, France, Fields Medalist 2010).

Professor Henri Berestycki giving his lecture at VIASM Annual Meeting 2015

Professor Cedric Villani giving his lecture at VIASM Annual Meeting 2015

The series usually attracts prominent Vietnamese mathematicians and researchers from various institutes and universities in Vietnam. It is said from the first session of this year meeting that there are more young Vietnamese audience and they are more active as well as having a very good discussion with the speakers. This year meeting attracts more than 60 participants.

2. Workshop on Quantum Information Theory and Related Topics

The quantum information science is a new information science based on the principle of quantum mechanics. Each state in quantum mechanics can be represented by a density matrix.

A total of 21 talks was given at the Workshop on Quantum Information Theory and related Topics from 1 to 3 September 2015. This workshop aims to bring recent study in this topic: The analysis/geometry structures on the space of positive semi-definite operators, operator inequalities, maps preserving orders on operators and related topics (such as moment problem). This workshop also created many opportunities for young mathematicians to exchange ideas and discuss with international mathematicians.

3. Summer School: Number Theory through the Ages

From September 7–11, 2015, the summer school "Number Theory through the ages" took place at VIASM. The summer school's target audience was graduate students and advanced undergraduates in number theory, algebra and related areas. While modern number theory has a reputation of being technically formidable and complicated, many well-known classical problems in number theory like Fermat's Last Theorem, the Prime Number Theorem

The participants of Summer School

and Quadratic Reciprocity admit elementary formulations. The summer school's main aim was to bridge the seemingly wide gap between the two, by studying classical problems under a modern optic and expose how the fundamental modern ideas were conceived. It is the organisers' hope that such a study would encourage students to appreciate the beauty of number theory and pursue further study in the subject.

4. Mini-course: Homology Decompositions and Applications

A lectures of the mini-course "Homology decompositions and applications" was given by Professor Jean Lannes – Paris 7 (Université Paris Diderot) in the afternoon every Tuesday and Thursday from October to November, 2015.

The content of the course began with recalls on homotopy colimits (and homotopy limits). He related the classifying space BG of a compact Lie group G with the homotopy colimit of the diagram of the centralisers of the elementary abelian p-subgroups $E \subset G$ (result of S Jackowski and J McClure: Homotopy decomposition of classifying spaces via elementary abelian subgroups, *Topology* 31, 1992, 113–132); the presentation followed the one by W G Dwyer and C W Wilkerson: A cohomology decomposition theorem, *Topology* 31, 1992, 433–443.

In the next part, he explained the generalisation uncovered by Hans-Werner Henn where BG is replaced with some suitable Borel construction: Centralisers of elementary abelian p-subgroups, the Borel construction of the singular locus and applications to the cohomology of discrete groups, *Topology* 36, 1997, 271–286.

Finally, he used what precedes to get information on the cohomology of some arithmetic groups (unpublished work with Hans-Werner Henn). On this occasion, he used the theory of lattices and made an incursion in the world of buildings.

5. Workshop on Evolution Equations and Applications

The three-day workshop was held at VIASM on October 19–21, 2015. Leading experts in applied analysis and evolution equations from US, Germany, France, Japan, and Vietnam have attended the workshop to give lectures and talks on recent developments of the fields

of ordinary and partial differential equations and their applications to fluid dynamics, physical and biological problems, diffusion processes. Central attention of the workshop focused on the well-posedness (or ill-posedness) and asymptotic behaviour of solutions to evolution equations such as stability, periodicity, almost periodicity, existence of invariant manifolds for solutions to evolution equations. Applications to incompressible fluid flows, heat diffusions, implicit dynamical systems, control systems, gene propagations and algebraic differential equations have been given.

6. DAAD Spring School on Combinatorial Stochastic Processes

DAAD Spring School on Combinatorial Stochastic Processes has opened on March 7, 2016 at VIASM.

The topic of spring school is "Combinatorial stochastic processes and its applications". This field studies random permutations and partitions of a large population, and the reverse process, the merging of smaller units into progressively larger communities, called coalescent.

These processes are abundant in nature. In biology, species form a phylogenetic tree. In physics, particles merge or split at atomic levels. In engineering, gas and oil fields come in fragments of different sizes. In computer science, one wants to organise articles by topics, keywords or pictures to help searching and recommendation.

In these applications, scientists often need to infer the partition or coalescent process from limited data. For example, given a collection of articles, one wants to organise them into major topics. Unlike clustering in machine learning, however, the articles may keep coming, new topics appear, and topics may merge overtime. Thus, both the data and the partition and coalescent processes are evolving, often at random.

Combinatorial stochastic processes is precisely the area of mathematics that models such processes. It gives strong probabilistic theorems that allow scientists to do such inferences.

There are six lecturers at the School: two senior professors, three junior professors and one PhD candidate (Ms Geldhauser) who give the tutorials. Their diverse expertise cover the major topics of combinatorial

stochastic processes, which are random trees, coalescent and diffusion processes, geanalogy applications, random partitions, and random graphs. Of the six lecturers, three are women, and four are young researchers, within five years of obtaining their PhD.

The goal of these lectures is to introduce graduate students, scientists and researchers in related fields to the major tools, open problems and applications of combinatorial stochastic processes. The discussion sessions serve as a venue for the participants and lecturer to build a research community, mingle, exchange ideas, and work on open questions.

The School attracts 40 participants from both within and outside of Vietnam, including Mongolia, the Philippines, Indonesia, Malaysia, and Singapore.

It lasted until 18 March, 2016. For details program, please visit: *http://viasm.edu.vn/hdkh/daad-spring-school-on-combinatorial-stochastic-processes?userkey= chuong-trinh*

The participants of DAAD Spring School

Other News

The Latest Largest Prime

A press release from GIMPS (the Great Internet Mersenne Prime Search) was picked up by the BBC on January 20, 2016: "Largest known prime number discovered in Missouri," a title which led Evelyn Lamb to comment on Slate (22 January) that it sounds "a bit like this new prime number … was found in the middle of some road." The BBC posting shows the beginning of a scroll-through of all of M74207281, as this number ($2^{74207281}-1$) is called, with perky musical accompaniment.

On Slate the coverage is more extensive, and quite enthusiastic. "Here's What's So Exciting About the New Largest Prime Number Mathematicians Discovered" is the link from their front page. As Lamb tells us, "GIMPS … is a large distributed computing project in which volunteers run software to search for prime numbers." She tells us what Mersenne primes are ("The M in GIMPS and in M74207281 stands for Marin Mersenne, a 17th-century French friar [but much more -TP] who studied the numbers that bear his name. Mersenne numbers are 1 less than a power of 2. Mersenne primes, logically enough, are Mersenne numbers that are also prime. The number 3 is a Mersenne prime because it's one less than 2^2 which is 4") and what we have lost by concentrating on the Mersennes: she uses the prime number theorem to estimate that "There are about 1022,338,610 primes less than M74207281, and approximately all of them are between it and the next-largest known prime." She also explains the reason for that concentration: there is a special primality test "that can determine whether a number is prime without actually factoring it," that only works for Mersenne numbers. For a lucid description of this test, the Lucas–Lehmer algorithm, listen to Matt Parker on Numberphile.

The story also ran in the New York Times on January 22. Kenneth Chang's "New Largest Prime Number? It's Really, Really Long" starts: "The largest known prime number, newly discovered, is almost five million digits longer than the previous record-holder." Chang quotes George Woltman, who founded the GIMPS project after he retired 20 years ago: "I've always been interested in prime numbers. I had a lot of time on my hands." And he spoke with Curtis Cooper (University of Central Missouri) whose computer found M74207281: "one of the early enthusiasts, joining Gimps in 1997. He has the program currently installed on 800 PCs on the university's two campuses. Dr Cooper does research in the mathematical realm of number theory and teaches computer science classes. 'This kind of marries the two fields together,' he said."

A nice philosophical point: Chang also tells us that the UCM computer (PC No. 5 in Room 143) "churned for 31 days before completing its calculation that $2^{74207281}-1$ is a prime," and reporting the result, on 17 September, 2015. But because of a "glitch on the server" no human being was informed. The official discovery date is 7 January, 2016 when the message was picked up during routine maintenance.

2016 Breakthrough Prize in Mathematics Awarded to Ian Agol

The 2016 Breakthrough Prize in Mathematics has been awarded to Ian Agol "for spectacular contributions to low dimensional topology and geometric group theory, including work on the solutions of the tameness, virtual Haken and virtual fibering conjectures." Agol is a professor of mathematics at the University of California, Berkeley, currently on sabbatical at the Institute for Advanced Study in Princeton, NJ. (Photo of Ian Agol courtesy UC Berkeley.)

The award is US$3 million. As have all five past math laureates, Agol plans to give $100,000 of his prize winnings to support graduate students from developing countries through the Breakout Graduate Fellowships administered by the International Mathematical Union.

The Breakthrough Prize was founded by Mark Zuckerberg and Yuri Milner. "Breakthrough Prize laureates are making fundamental discoveries about the universe, life and the mind," Yuri Milner said. "These fields of investigation are advancing at an exponential pace, yet the biggest questions remain to be answered."

2016 New Horizons in Mathematics Prize Awarded to Larry Guth and André Arroja Neves

The New Horizons in Mathematics Prize is awarded to promising junior researchers who have already produced important work in mathematics. The 2016 awards of $100,000 were given to Larry Guth, MIT, "for ingenious and surprising solutions to long standing open problems in symplectic geometry, Riemannian geometry, harmonic analysis, and combinatorial geometry," and to André Arroja Neves, Imperial College London, "for outstanding contributions to several areas of differential geometry, including work on scalar curvature, geometric flows, and his solution

Larry Guth

André Arroja Neves

with Codá Marques of the 50-year-old Willmore Conjecture." The third New Horizons in Mathematics Prize, recognising Peter Scholze of Bonn University, was declined.