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NEWSLETTER

OF THE

NEW ZEALAND MATHEMATICAL SOCIETY

Contents

PUBLISHER'S NOTICE

This newsletter is the official organ of the New Zealand Mathematical Society Inc. This issue was edited by Miguel A Moyers González and Phillip L Wilson. Editorial enquiries and items for submission to this journal should be submitted as plain text or LaTeX files with "NZMS newsletter" in the title of the email to phillip.wilson@canterbury.ac.nz. Example LaTeX files are available upon request from the editors.

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The newsletter is available at: nzmathsoc.org.nz/?newsletter

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EDITORIAL

This is our first Newsletter issue as joint Editors. We would like to acknowledge the hard work that Mark Wilson has put in as Editor over the last few years, and thank him for helping us get started. Looking back over the many issues of the Newsletter, we can't help but be impressed by what all of our predecessors have achieved, and we hope that we can continue their good work. In that vein, we invite and welcome your feedback on this and all our future Newsletters.

We would also like to thank Bruce van Brunt for his work on book reviews for the Newsletter. Bruce is busy being the NZMS Treasurer, so please get in touch if you would like to volunteer for this role.

The Newsletter belongs to the mathematical community of Aotearoa New Zealand, and so please send us contributions! If you have an article you would like to write, please contact us and we can discuss your idea. Interviews of visitors are also very welcome and can be submitted to us at any time. These can be quite conversational in format, and so need not be daunting to create. If you have a good idea for a Profile subject, or would like to a write a Profile, then do let us know. Letters to the Editors can also be published in the Newsletter, if such short correspondence is aimed at genuinely helping to create useful discussion and interaction between members on mathematical topics.

We hope that you enjoy this issue, and we look forward to hearing from you. Our contact details are on the previous page.

Miguel Moyers and Phil Wilson

PRESIDENT'S COLUMN

This is the first purely electronic edition of the New Zealand Mathematical Society Newsletter. As I write, Julia Gog's Forder lecture tour is underway. Many thanks to Mick Roberts for coordinating Julia's tour. Gaven Martin will tour the US later this year as the third outgoing MacLaurin lecturer, and Hinke Osinga has been selected by the London Mathematical Society to be the next Aitken lecturer.

Gaven Martin has been the Editor of the NZ Journal of Mathematics for 18 years, and is stepping down. We thank Gaven for his long service! The NZJM publishes research, expository and survey articles, in pure mathematics, applied mathematics and mathematical statistics. The Journal is published by a joint committee of the NZMS and the Department of Mathematics of the University of Auckland. Rod Goldblatt and Shaun Cooper are the NZMS representatives on this committee, and they welcome suggestions of possible editors and about anything else to do with the Journal.

David Gauld was named an officer of the New Zealand Order of Merit, for services to mathematics, in the 2016 New Year Honours List. Congratulations David! David's services to mathematics include his extensive research on aspects of topology. He was also a president of the NZMS, the first editor of the NZJM, and a co-founder of the NZ Mathematics Research Institute — see also page 10 of this issue.

Included later in the NZMS NOTICES section of this Newsletter are calls for nominations for the NZMS Research Award, and the NZMS Early-Career Award, as well as a call for applications for student-travel grants.

There are several events to look forward to during the year. The Mathematics-in-Industry NZ Study Group is taking place at the Victoria University of Wellington on 4–8 July. Attendance at MINZ is free for participating mathematicians in return for volunteering to work on the industrial problems. The NZ Mathematics Colloquium this year will also be at the Victoria University of Wellington: the conference will start with a welcome reception on Sunday evening 4 December, and will run Monday to Thursday, with Thursday being Maths Education Day. See also page 28 of this issue.

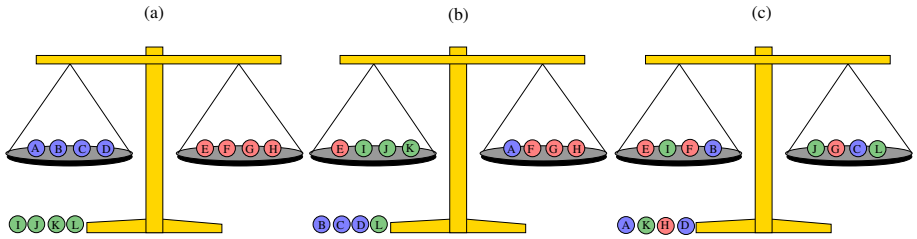
The NZMS recognises that childcare responsibilities can be a barrier to attendance at conferences. The provision of childcare or funding towards childcare costs by organisations like ours at their annual conference is becoming more common. To help address the possible financial barriers for parents or carers to attend the Colloquium in 2016, the NZMS will provide up to $1000 towards additional costs related to childcare responsibilities. Due to the diversity of situations and individual requirements, the spending of the funds will be discretionary, especially in this trial year. Interested persons should discuss their needs with members of the NZMS Council and with the local organisers.

Astrid an Huef

MATHEMATICAL MINIATURE

MM39: Two old problems

In MM38, I recalled the 12 coin (or 12 marble) problem and referred to the replies sent by Don Nield and Jörg Hennig. Jörg gave a detailed solution illustrated by a beautiful picture.



Don recalled, in about 1960, discussing the question with Laurie Carr, his commanding officer on HMNZS Philomel. The captain had, in turn, heard about the problem from the then Governor-General, Viscount Cobham, during a dinner conversation. Thus the great and the mighty enjoy the same puzzles as the rest of us. Now that I look back over Don's contribution I see that his reference to Martin Gardner's solution has a relationship to the one I will present below.

We are given 12 coins and told that one of them might have the wrong weight. We are allowed to have three weighings with balance scales and we need to decide a priori which coins to put on the two sides so that when the three weighings have been made, we can decide if any coin is wrong and, if so, whether it is too heavy or too light. As a preliminary result we can conclude that we must put four coins on each side for the first weighing, and because the weighings are to be decided a priori, this will apply also to each of the weighings. (If we put more than four on each side in the first weighing, we cannot decide between the remaining options if they don't balance; and if we put less than four on each side we cannot decide between the remaining options if they *do* balance). Write **0**, **1** and **2** for the three members of $GF(3)$ and **001**, **002**, **010**, ..., **222** for the the non-zero elements of $GF(3)^3$. If $\mathbf{v}$ is one of these vectors then $-\mathbf{v}$ is formed by replacing **1** by **2** and **2** by **1** in the components of this vector. If 12 vectors in this set can be found with the properties that if $\mathbf{v}$ is a member then $-\mathbf{v}$ is *not* a member, and, for the first, second and third components of the 12 vectors, each of **0**, **1** and **2** occurs 4 times, then we have the ingredients for a weighing strategy. Denote the selected vectors by $\mathbf{v}_1$, $\mathbf{v}_2$, ..., $\mathbf{v}_{12}$. For each of the coins, $n = 1,2,\ldots,12$, use the components of $\mathbf{v}_n$ to assign coin number n in each of the three weighings with **1** denoting the left side of the balance, **2** the right side and **0** neither side. When the weighings have been carried out, construct the vector made up from the three outcomes. If the result is **000** then all coins have equal mass. If the result is $\mathbf{v}_n$ then coin number n is too heavy and if the result is $-\mathbf{v}_n$ then coin number n is too light. But can we select the 12 vectors we need to implement this weighing sequence? Yes. For example, we can choose the vectors **001**, **011**, **012**, **020**, **102**, **112**, **120**, **121**, **200**, **202**, **211**, **220**. Note that **120** is coin A in the solution of Jörg but coin B is absent from the list of vectors I gave. Can you find the 12 vectors which correspond to his coins?

A problem introduced in MM38 is to find the sum of the series $1-\frac{1}{4}+\frac{1}{7}-\frac{1}{10}+\cdots$. For $\theta\in(-\pi,\pi)$, substitute $z=\exp(\mathrm{i}\theta)$ into the series $\log(1+z)/z = 1-\frac{1}{2}z+\frac{1}{3}z^2-\frac{1}{4}z^3+\cdots$, with the result $\phi(\theta) := \exp(-\mathrm{i}\theta)\log|1+\exp\mathrm{i}\theta| + \mathrm{i}\arctan(\sin\theta/(1+\cos\theta))$. We can omit the $2\pi n\mathrm{i}$ term because of the continuity of ϕ. The required result is found to be

$$\tfrac{1}{3}\big(\phi(0)+\phi(2\pi/3)+\phi(-2\pi/3)\big) = \tfrac{1}{3}\log 2+\pi 3^{-3/2}.$$

I received the answer from Graeme Wake with the offer of a proof. John Harper with a reference to Bromwich *Infinite Series* quoted a result by Gauss for the series $\sum_{n=0}^{\infty}(-1)^n(a+nb)^{-1}$ and pointed out that the case $a=1, b=4$ was given as a Mathematical Tripos question in 1896. Finally, Jörg Hennig gave a proof based on the integral $\int_0^1(1+x^3)^{-1}\mathrm{d}x$. If you sum the first 1000 terms in the series the result is 0.83548215 which is a poor approximation to the exact answer 0.83564885 (rounded to 8 decimals). If the partial sums are $s_1, s_2, s_3, \ldots$ then a single application of the van Wijngaarden transformation maps this to $\frac{1}{2}(s_1+s_2), \frac{1}{2}(s_2+s_3), \frac{1}{2}(s_3+s_4), \ldots$. If we start with just the first 10 partial sums and apply the vW transformation 9 times the result 0.83567262 is a better approximation than s_{1000}. Is it possible to explain this good result?

J.C. Butcher

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CYBERMATH

On 1 March 2016 the journal *Discrete Analysis* launched at discreteanalysisjournal.com. In addition to an impressive editorial board led by Timothy Gowers, it makes several important innovations. I urge all readers to check out this journal, and ask whether their own favourite journals perform near this standard. In my opinion it is a major step forward in mathematical publishing. Opening with a solution by Terence Tao to the Erdös discrepancy problem posed in 1957 sets a high standard in content, but there are also major improvements in pricing, added value, and operations. The new features include:

- No charges for authors or readers (sometimes called "diamond open access").
- The journal is an arXiv overlay — papers are submitted via arXiv.org and all versions remain there rather than on the journal website.
- Editorial summaries of each article, which put articles into context and allow important information from referee reports (normally lost to all but the author and editor) to be presented.
- A properly designed 21st century website.

It seems clear to me that the traditional commercial publisher, despite their self-promoting advertising, resist innovation rather than drive it. This is what one would expect in an oligopolistic market with very imperfect competition. However there are some new publishers who appear to understand that researchers do not want publishers to own the titles of journals, but rather to compete on price and service for the honour of publishing. In other words, publishers should be the servants or contractors, instead of the masters their actions reveal them to believe themselves to be. Among these I have spent considerable time looking at Ubiquity Press and Scholastica.

Scholastica provides the platform used to run *Discrete Analysis*, and charges US$10 per paper flat fee; *Discrete Analysis* covers this from a grant. My experience of running *Online Journal of Combinatorics* is that an ε-income journal is preferable to a zero-income journal. Even when volunteers do the basic clerical work of processing papers and running peer review, there are small financial costs such as those associated with assigning DOIs. For the even smaller costs associated with web hosting, it is normally reasonable to expect university subsidy.

Zero-income diamond open access journals have a proud history in mathematics — the *NZ Journal of Mathematics* is one such, and *Electronic Journal of Combinatorics* one of the most prominent (see mathoverflow.net/questions/231206/free-open-access-peer-reviewed-math-journal for more discussion). Given the prominence of arXiv, the idea of arXiv overlay journals (which are necessarily free to read) makes obvious sense, and has been tried before, for example by *Annals of Mathematics*. Previous attempts have foundered because of a lack of income once subscriptions are cut — another example of how $\varepsilon \gg 0$ in this context.

Incidentally, it is a disgrace that none of the NZ universities, nor any government or other organization, is an institutional member of arXiv (confluence.cornell.edu/pages/viewpage.action;?pageId=241664021). Three Australian universities are and even one from South Africa. The saving of US$1500–3000 incurred by free riding on others wouldn't do much to ease my conscience.

If an editorial board feels that it needs support with such matters as DOI assignment, archiving, plagiarism detection, indexing, and editorial managers, it can consider a commercial publisher. The traditional large ones (Elsevier, Springer, Wiley, Taylor and Francis) have proven to be far too concerned with profit maximization than with the public good to be seriously considered. In addition, they have invested in old-fashioned systems and are very inflexible. Recently I have found one new scholarly publisher, Ubiquity Press (ubiquitypress.com, a spinoff of University College London) that provides full service open access publication for approximate costs of US$500 per paper, far lower than the traditional ones. Furthermore there is no sacrifice of quality — in fact it provides better service than the big publishers. It is used by the Open Library of Humanities, a very promising venture funded by library consortia whose model I hope will spread to mathematics very soon — AUT is a supporting institution but no other NZ organization is (about.openlibhums.org/libraries/supporting-institutions/). Another more traditional "new" publisher, Mathematical Science Press (msp.org) founded by Rob Kirby, provides very high quality typesetting and editorial software but still uses the subscription model.

Now is a critical time in scholarly publishing. I urge all editors, authors and readers to play their part in the transition to a more efficient and effective operation by voting with their feet and putting their money where their mouth is. The current situation of limited access at high prices, increasing at a rate well beyond that of inflation or indeed of actual reasonable costs, is not sustainable. Of course, this is my opinion; the opinion of the mathematical community is unclear. Please fill in the survey listed in Notices in this issue so that more progress can be made on these issues (everyone who has acted as author, referee, editor or reader of a mathematical journal in the past three years is eligible).

Mark C. Wilson

PROFILE

Professor James Sneyd, FRSNZ

Dunedinite, musician, icon and pillar of the scientific establishment, it is well and truly time for Professor James Sneyd to grace the profile pages of our newsletter. James was born into a medical family in Dunedin and, except for a brief stint in Tennessee with his parents, spent his childhood and teenage years in our southernmost university city. With parents who were doctors, parents' friends who were doctors, parents' friends' children who went to medical school, he enrolled at the University of Otago. Thanks to numerous engaging conversations with his uncle Alfred (profile in NZMS Newsletter 105), James was curious about mathematics, and included a math course in his medical programme. When I asked about the switch to mathematics, the answer was clear and unambiguous: really enjoyable lectures from Dennis McCaughan, followed up by another insightful conversation with Alfred. Upon realising that you could use math to work stuff out, and actually understand it, James changed his major to include mathematics.

Studying mathematics and being a mathematician are two different things – the only disagreeable part of my conversation with James was my attempt at a standard question: "when did you decide to be a mathematician?" James said that he wasn't a real mathematician, so the question didn't make sense. After a bit of back and forth, we settled on talking about his becoming "a not real mathematician". Another clear and unambiguous answer: browsing the mathematics shelves in the library, James came across Jim Murray's "Lectures on Nonlinear Differential Equations in Biology" (now out of print). He read it from cover to cover, several times, and decided that this was what he wanted to do. With Jim Murray. In Oxford. The first strategy didn't work out: get a Rhodes Scholarship [fellow Otago Alumnus and All Black David Kirk got it instead]. The second try didn't work out either: writing to Jim Murray, asking for funding and a PhD place [knowledgable authorities suggest that the letter was received, read (due to the unusual surname), then thrown away with all the other such letters]. Instead, James applied for the top five US graduate schools for mathematical biology (chosen via "Top-ranked US graduate schools", again courtesy of the UoO library). After being offered places at all of them, it was the personal follow-up from Professor Charles Peskin that made James choose NYU (many readers will remember that receiving an

international phone call was a VERY BIG DEAL in 1980s New Zealand!). After numerous interesting graduate courses, James completed his thesis with Dan Tranchina and Charlie Peskin and was immediately offered a tenure-track position at UCLA. He was able to negotiate a delayed start, and finally went to Oxford to spend a year with Jim Murray.

Once at UCLA, James went to every physiology seminar that he could, and began his productive and renowned modelling and analysis of intracellular and intercellular calcium dynamics. Over 25 years, with coauthors and students, he has written approximately 100 papers on various aspects of calcium dynamics. His impressive body of work is guided by a very clear philosophy: "I've never proved a theorem, and I'm not going to start now. Don't waste time, solve the problem and get on with the Science." One of the foundations of his research success is to work closely with experimentalists, investigating problems that physiologists actually want to solve.

James returned to New Zealand in 1994, taking up a lectureship at the University of Canterbury. To hedge against the possible difficulties of maintaining long-distance collaborations with experimentalists, he decided to keep busy and put his enjoyment of writing to good use, by working on a book. Together with Jim Keener, James produced the first edition of *Mathematical Physiology*, recording in one place many of the exciting modelling successes of mathematical physiology from the twentieth century. The project took five years, and won the American Association of Publishers prize for best mathematics book of 1998. The "Twin Jim Physiology Wunderbook" [as it is known to the leading authorities] is used widely as a goto text, is a prized occupant of the bookshelves of many mathematicians (even real ones), and has been very influential. Indeed, following its publication, the book generated so much attention that Keener and Sneyd spent another five years revising, correcting, expanding and updating for the second edition.

In 1998 James received an offer from the University of Michigan that was too good to turn down, and relocated with his young family to the US. However, almost immediately they realised that they really did prefer life in New Zealand. This time, James returned to Massey Albany, and then in 2002 succeeded John Butcher as Professor of Applied Mathematics at the University of Auckland. As well as prolific research output and supervising dozens of graduate students, James has served approximately four years as Head of Department at UoA. He is particularly proud of the appointments that occurred through that period, increasing the number of applied mathematics Professors from one to four, and recruiting a number of outstanding young academics.

James is a masterful academic, and in light of his enviable research profile and strong academic leadership contributions, I asked him for some advice for readers looking toward graduate school, for a first academic position, or wondering how to thrive once securing a permanent job. He said that the two most important attributes are to write well, and to speak well. For those who become captivated by mathematical biology, his words were even more specific: "Never, ever prove a theorem. Ever. Just not relevant. Always look at the data."

Personally, I enjoy talking to James. He is fun to listen to, and fun to work with. He is unflappable, patient, direct and incredibly sharp. He takes mathematics and science very seriously, but does not take himself too seriously. However, as many readers know, his own experimental endeavours with hair colour have not always been brilliant. I finished our conversation by asking about his favourites: blue (inculcates a sense of pride, because it is hard to do); green (easy to do); purple (fades fast); pink (lasts longer at important formal events).

Rua Murray

LOCAL NEWS

AUCKLAND UNIVERSITY OF TECHNOLOGY

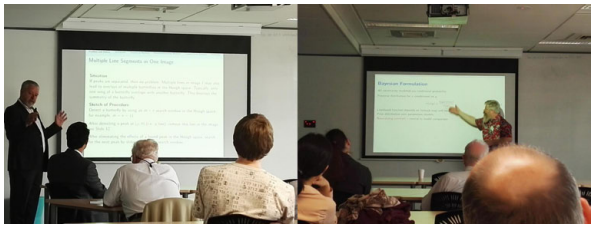
SCHOOL OF ENGINEERING, COMPUTING AND MATHEMATICAL SCIENCES

In November 2015, the School of Engineering and the School of Computer and Mathematical Sciences were officially amalgamated as the School of Engineering, Computer and Mathematical Sciences (SECMS). The newly formed SECMS is the largest school within the Faculty of Design and Creative Technologies at AUT. The Department of Mathematical Sciences is one of six departments within SECMS, and Professor *Jiling Cao* was appointed the head of department.

The Mathematical Sciences Department is seeking for an appropriate candidate to fill an associate professor or professor position in Statistics/Analytics. An ideal appointee will take a leadership role for the Statistics/Analytics subgroup and the newly launched Master of Analytics programme. Currently, the selection of applicants is still in the process.

Event

On 7–8 December 2015, the Mathematical Science Research Group (MSRG) continued the annual AUT Mathematical Sciences Symposium. This is a joint effort of Professors *Jiling Cao* and *Jeffrey Hunter*, with the assistance of Drs *Kate Lee*, *Sarah Marshall*, *Katharina Parry* and *Wenjun Zhang*. The Symposium attracted over 40 participants from New Zealand and overseas, with 29 talks including eight invited plenary ones. Six "out of town" invited Symposium speakers were funded from MSRG Research Fund. The Symposium focused mainly on some areas in Applied Mathematics and Analytics/Statistics. The main purpose of this event is to develop and promote opportunities for AUT academic staff working on these areas to collaborate with colleagues from other universities. It was an outstanding success with many favourable comments from the external participants.



Professors Reinhard Klette and Colin Fox presented talks at the symposium.

Visitors

Professor Gerald Beer, from Department of Mathematics, California State University, visited Professor *Jiling Cao* in February 2016 and presented a talk entitled " Uniform continuity of a product of real functions" in the Mathematical sciences seminar series.

Professor Peter Nyikos, from Department of Mathematics, University of South Carolina, visited Professor *Jiling Cao* in March 2016 and presented a talk entitled "Discontinuities and smooth curves in n-space" in the Mathematical sciences seminar series.

Travel and Conference Participation

Dr *Hyuck Chung* gave a talk on "Acoustic scattering by an array of soft scatterers" at the 2nd Australasian Conference on Wave Sciences (KOZWaves) at The University of Adelaide, 6–9 December 2015. Dr Chung was one of the organisers and the School of Eng. Comp. & Math Sciences, AUT was one of the primary sponsors of the conference. He also visited Associate Professor Nicole Kessissoglou at the School of Mechanical and Manufacturing Engineering, the University of New South Wales after the conference.

Associate Professor *Sergiy Klymchuk* presented the paper titled "Using Puzzles, Paradoxes, Provocations and Sophisms for Enhancing Teaching and Learning of Engineering Mathematics" at the 12th Engineering Mathematics and its Applications Conference in Adelaide, 6–9 December 2015.

Dr *Kate Lee* gave a talk at the 8th International Conference of the ERCIM WG on Computational and Methodological Statistics (CMStatistics 2015) in London, UK, 12–14 December 2015. She also visited Dr. Cristiano Villa, School of Mathematics, Statistics & Actuarial Science, University of Kent, UK.

Wenjun Zhang

UNIVERSITY OF AUCKLAND

DEPARTMENT OF MATHEMATICS

Honours

John Butcher will be honoured by the 14th International Conference of Numerical Analysis and Applied Mathematics, a major international annual conference which will be held in Rhodes in September 2016. Three of the invited speakers are winners of the Dahlquist Prize administered by SIAM, for outstanding work by someone aged 45 or less. For details of this major event, see icnaam.org. John is nearing the completion of the third edition of his highly-successful book *Numerical Methods For Ordinary Differential Equations*, and it is expected that this will be published during 2016.

David Gauld

David Gauld has been made an Officer of the New Zealand Order of Merit in the 2016 New Year Honours List, for his services to Mathematics. Congratulations David! This is a very well-deserved award. He has given exceptionally valuable and distinguished service to the NZ mathematical and university communities over a period of more than 40 years. In addition to his research and his teaching and supervision of students, the following can be noted about David, among many other things: Professor of Mathematics at the University of Auckland from 1981 to 2016, Head of the UoA Department of Mathematics for nearly 20 years between 1981 and 2005, First Editor of the *NZ Journal of Mathematics* and Chairman of the *NZJM* Committee since 1992, Co-founding Director of the NZMRI, and its Secretary for 14 years, Facilitated appointment of Vaughan Jones to a position at the University of Auckland, Initiated (with Vaughan Jones) the annual Summer Mathematics meetings, which have run since December 1994, Organised those summer meetings in 1994 and in 2006, Arranged in 2002 the first-ever Summer Topology Conference held in the southern hemisphere, President of the NZ Mathematical Society 1981–1982, Served a term as AVC (Research) at the University of Auckland 1994–1997, Facilitated initiatives to support Maori and Pacific students including the "Aldis" scholarships and helping set up the Tuakana programme, Renowned for his introduction of topology into the study of non-metrisable manifolds and differential structures on these, Author of the textbook *Differential Topology: an Introduction*, Winner of grants from the Marsden Fund and other sources — and he is renowned for his love of nature and the way that he shares this with his colleagues, including overseas visitors. Another award of note is a prize that David won in 1983. The periodical *Mathematical Intelligencer* set a worldwide contest, in which entrants were expected to write a short essay on a substantial mathematical fact, in a way that would be understandable to a lay person. David won the prize with a short essay, written separately in English and Maori, giving a proof of the "Fixed–point Theorem" that proves there must be at least one point in the earth's ocean at which the mean tidal range is zero. That typifies David's contributions: often humble, but profound and effective.

Maxine Pfannkuch transferred to the Department of Statistics 5 years ago, but she remains active in our Mathematics Education Unit. The New Zealand Statistical Association has bestowed on Maxine the Campbell Award for lifetime achievement and contribution to the profession. That award acknowledges the immense impact of her research on statistics education in New Zealand, and world-wide.

Stuart Scott was a plenary speaker at the 24th International Conference On Near-rings, Near-fields and related matters, held from July 5th to 12th 2015 at Manipal Institute of Technology, India. There he gave three talks, at the beginning, middle and end of the conference. Those covered an outline of his entire solution to the n-gen problem (210 pages). The first talk covered what the problem is, and historical developments leading up to its solution. The second covered the matter of the 26 mutually-exclusive categories that the solution fell into. The third outlined some intriguing features that the full proof required. Those included matters to do with group and number theory.

Caroline Yoon has been awarded a $200,000 TLRI grant (with John Griffith Moala as co–Principal Investigator), for their project "Making Mathematical Thinking Visible". They will cooperate with mathematics teachers and lecturers to design reporting tools for documenting, measuring and describing the complexity of mathematical thinking, revealed by modelling activities.

Anton Gulley has been awarded the R.H.T. Bates Postgraduate Scholarship of the RSNZ. This one-year scholarship is intended for PhD students in the physical sciences and engineering. Anton's thesis work (jointly supervised by Jari Kaipio) focusses on imaging the Alpine Fault, and he is developing a 2-D inversion methodology.

Soizic Terrien is a Post-doctoral Fellow with us under the Dodd-Walls CoRe. She was awarded the Rocard Prize by the French Acoustical Society for the best PhD thesis in France on acoustics in 2014. As part of that Prize, she has been invited to present her thesis on delay effects in blown musical instruments at the next Congrès Français d'Acoustique, at Le Mans in April 2016.

Promotions and Appointments

Bernd Krauskopf is the new Head of Department, as successor to *Eamonn O'Brien*.

Tom ter Elst and *Steven Galbraith* have been promoted to Professor, and *Igor Klep* has been promoted to Associate Professor.

Graham Donovan has been promoted to Senior Lecturer (level 6), while *Shixiao Wang* has been promoted to Senior Lecturer (SL 1).

Anna Barry arrived in February, as Lecturer, and *Igor Kontorovich* arrived in February, as Lecturer in our Mathematics Education Unit.

Phil Kane, *Rachel Passmore*, and *Julie de Saedeleer* have been promoted to Professional Teaching Fellow (PTF3).

Retirements and Resignations

Bill Barton and *Mike Thomas* both retired as Professors in our Mathematics Education Unit, on February 11. The ICMI President Prof. Ferdinando Arzarello came from Turin University, and several others came to NZ to celebrate Bill and Mike: Dr Ban Heng Choy (National Institute of Education, Singapore), Prof. Merrilyn Goos (School of Education, University of Queensland), Dr Ye Yoon Hong (Korea), Prof. Dame Celia Hoyles (Institute of Education, University of London), Prof. Barbara Jaworski (Loughborough University), Prof. Colette Laborde (Cabrilog), Prof. Jean–Marie Laborde (Cabrilog), Prof. Richard Noss (The Knowledge Lab, University of London),Dr Caroline Poisard (ESPE-Bretagne) and Dr Sepideh Stewart (University of Oklahoma). And on February 12, the LOGOS 17 Symposium was dedicated to Bill and Mike.

Robert Chan retired as Senior Lecturer on January 29. A Symposium honouring him was held, with talks given by *Philip Sharp*, *Allison Heard*, *Shixiao Wang*, Helmut Podhaisky (Martin–Luther Universität Halle-Wittenberg), Pamela Burrage (QUT), John Butcher, Nicolette Rattenbury and Kevin Burrage (QUT).

Dimitri Jean Jacques Leemans will resign as Associate-Professor at the end of Semester 1, and return to the Vrije Universiteit Brussel.

Greg Oates will resign his post as Senior Lecturer in the Mathematics Department, with effect from June 26. He will take up a Senior Lectureship in the Faculty of Education at the University of Tasmania at Launceston. This is a splendid opportunity for Greg to build his career, and we all join in congratulating him on this new challenge.

Other News

Wesley Marek Maciejewski is an Honorary Academic in our Department. He is very happy to announce that Grace Anne Maciejewski arrived on March 9 (at 3740 grams). She and Ang are doing well — and so are Wes and Avery. The family will move in August to California, where Wes will become an Assistant Professor of Mathematics at San Jose State University.

Alan Delos Santos (from Papatoetoe High School) is our Teaching Fellow for 2016.

Boris Pavlov was a Professor in our Department from 1994 to 2007. In 2009 Boris joined the Institute for Advanced Study which had been formed at Massey University-Albany, and in 2014 he became a member of their research centre. Boris was a very stimulating and helpful colleague. Early in 2015 I wanted to get two important papers by Semyon Aronovich Gershgorin on solution of finite-difference elliptic equations, which had been published at Leningrad in 1927 and 1929. Those journals are now extremely rare and it is almost impossible to get copies of those papers. Boris was on a prolonged visit to St Petersburg, where he and a colleague at St Petersburg Technical University carried out very extensive searches, and they managed to find those journals and send me photopies of Gershgorin's papers. I found those papers to be so important that I have translated them into English, for publication with extensive commentary. I did not then know how poor was Boris's health; and he died on 2016 January 31, at the age of 79. An obituary article appears in OBITUARIES in this *Newsletter*.

Likewise, an obituary article appears in OBITUARIES in this *Newsletter* for *Marin Segedin*, who was a Lecturer and then Senior Lecturer in our Department, from 1949 to 1968. He died on January 25 at the age of 93.

Lois Kennedy was the Head of our Departmental Office, from 1980 to 1992. She was quiet and frail in appearance, but very effective and helpful to people. Her son Royd became a firefighter at Manukau, and in 1990 he went to a crashed oil tanker which was burning, with a 12-year old girl trapped underneath it. There was a risk that the burning tanker might explode at any time. Royd crawled under that burning tanker to comfort the girl, who was trapped there for an hour until she was rescued. He was awarded a George Cross for his gallantry, and later he acted as himself in a feature film about that event. In 2011, when Lois was aged 81 and living in Christchurch, her vision was impaired, and she used a walking frame. On January 21 she heard screams for help from a neighbour, who was being attacked by her 21-year old son, armed with a samurai sword. Lois grabbed a hearthbush and tottered as rapidly as she could to her neighbour, where she repeatedly bashed the attacker with her brush. Nobody else responded to the desperate cries from Lois and her neighbour, and so when she had partly subdued the attacker she tottered back home and phoned the police. The police reported that, without Lois's intervention, they could have been dealing with a murder. The neighbour survived, but was hospitalized for weeks. On 2013 December 2, when Lois was aged 84 and very frail, she received the NZ Bravery Award. She died very peacefully on 2016 February 12, at the age of 86.

Visitors

Prof. Ferdinando Arzarello (Turin University),Dr Shi Bai (ENS Lyon), Dr Iztok Banič (University of Maribor, Slovenia), Prof. Gerald Beer (California State University), Prof. Geir Bogfjellmo (Chalmers Institute of Technology, Sweden), Prof. Rita Borromeo-Ferri (Universität Kassel), Prof. Henk Bruin (Universität Wien), Prof. Chris Budd (University of Bath) as Seelye Lecturer, Prof. Kevin Burrage (QUT, Brisbane), Dr Pamela Burrage (QUT, Brisbane), Prof. Andreas Čap (Universität Wien), Prof. Jon Carlson (University of Georgia, Athens), Dr Ban Heng Choy (National Institute of Education, Singapore), Prof. Jernej Cinc (Universität Wien), Prof. Harry Dankowicz (University of Illinois at Urbana-Champaign), Dr Heiko Dietrich (Monash University, Melbourne), Prof. Piotr Faliszewski (AGH Institute of Technology, Krakow), Prof. Yanquan Feng (Beijing Jiaotong University), Prof. Merrilyn Goos (University of Queensland), Prof. Frédéric Gourdeau (Université Laval, Quebec), Prof. John Guckenheimer (Cornell University), Dr. Paul Hadwin (University of Waterloo, Canada), Dr Matthias Hammerl (University of Greifswald), Prof. Alan Hastings (University of California, Davis), Dr Ye Yoon Hong (Korea), Prof. Dame Celia Hoyles (University College London), Prof. Edward Huang (National Cheng Kung University, Taiwan), Prof. Tony Humphries (McGill University, Montreal), Dr Dmitry Jakobson (McGill University, Montreal), Dr Lina Jaurigue (TU-Berlin), Prof. Barbara Jaworski (Loughborough University), Prof. Julien Keller (Aix-Marseille University), Prof. Ruth Kellerhals (Université de Fribourg, Switzerland), Dr Judy Kennedy (Lamar University, Beaumont, Texas), Dr Anmar Khadra (McGill University, Montreal), Dr Marc Kilgour (University of Toronto), Dr Michal Kotrbcik (University of Southern Denmark), Dr Klavdija Kutnar (University of Primorska, Slovenia), Prof. Colette Laborde (Cabrilog), Prof. Jean-Marie Laborde, (Cabrilog), Dr Adeline Langlois (EPFL Switzerland), Dr Jean-Francois Laslier (Paris School of Economics), Prof. Charles Leedham-Green (Queen Mary, University of London), Prof. Martin Liebeck (Imperial College), Prof. Andreas Meister (Universität Kassel), Dr Klas Modin (Chalmers Institute of Technology, Sweden), Prof. William Newman (UCLA), Prof. Geoff Nicholls (Oxford University), Dr Rolf Niedermeier (Technical University of Berlin), Prof. Richard Noss (University of London), Prof. Peter Nyikos (University of South Carolina), Dr. Eugenia O'Reilly-Regueiro (UNAM, Mexico), Prof. Charles Plott (CalTech), Dr Helmut Podhaisky (Martin-Luther Universität Halle-Wittenberg), Dr Caroline Poisard (ESPE-Bretagne), Dr Smindu Ramanna (ENS Lyon), Dr José A. Rodrigues-Neto (ANU), Dr Phillip Rogaway (University of California, Davis), Dr Benjamin Sambale (Universität Kaiserslautern), Dr Friedrich Martin Schneider (Dresden University of Technology), Prof. Egon Schulte (Northeastern University, Illinois), Dr Jan Sieber (University of Exeter), Dr Josef Šilhán (Masaryk University, Brno), Dr Sepideh Stewart (University of Oklahoma), Dr Arman Taghavi-Chabert (Masaryk University, Brno), Prof. Krasimira Tsaneva-Atanasova (University of Exeter), Dr Leo Tzou (University of Sydney), Prof. Jethro van Ekeren (Universidade Federal Fluminense, Rio de Janeiro), Prof. Fréderik Vercauteren (Katholieke Universiteit Leuven, Belgium), Prof. Milo Viviani (Chalmers Institute of Technology, Sweden), Prof. Petr Vojtechovsky (University of Denver), Prof. Christopher Voll (Universität Bielefeld), Prof. Asia Ivic Weiss (York University, Canada), Prof. Richard Weiss (Tufts University), Dr Jinming Wen (ENS Lyon), Dr Weiqiang Wen (ENS Lyon), Prof. Xinyuan Wu (Nanjing University), Dr Wei-Hsuan Yu (Michigan State University), Prof. Valentin Zagrebnov (Istitut de Mathématique de Marseille), Prof. Aljaz Zalar (University of Ljubljana), Dr Sara Zemljic (University of Iceland), and Dr Li Zengpeng (Harbin Engineering University).

Garry J. Tee

DEPARTMENT OF STATISTICS

It was very big news all over the world when US-based researchers announced in early February that they that they had detected gravitational waves (ligo.caltech.edu/news/ligo20160211). And when they revealed their findings, via a live-streamed press conference, Department of Statistics Associate Professor *Renate Meyer* was up at 4.30am to watch it from her home in Auckland. Despite the early start, Associate Professor Meyer wouldnt have missed it — in the late 1990s, she was one of the researchers who laid the foundations for the sophisticated statistical data analysis strategies essential to the research. Read the full story at stat.auckland.ac.nz/en/about/news-and-events-5/news/news-2016/2016/02/gravitational-waves.html.

Professor *James Curran* has been elected a Fellow of the Chartered Society of Forensic Sciences for outstanding achievements in forensic science. To Professor Curran, the accolade is "recognition on the international stage of the regard in which my scientific peers and my professional community holds me and my work."

Professor *Thomas Lumley* has been made a Fellow of the Royal Society of New Zealand for his contributions both to statistical theory and to statistical practice. Professor Lumley, an Australian who moved to New Zealand and the university in 2010, says that its an honour to be recognised in his new homeland. "It's also recognition for the statistics community — we arent quite mathematicians, and aren't quite experimental scientists, so we can sometimes fall between the cracks." Read the full story at stat.auckland.ac.nz/en/about/news-and-

events-5/news/news-2016/2016/02/thomas-lumley-becomes-royal-society-fellow.html.

Statistics education expert Associate Professor *Maxine Pfannkuch* was recognised with a lifetime achievement award — the Campbell Award — at the New Zealand Statistical Association (NZSA) conference late last year. She says, "I work in the background as part of a collaborative team effort to improve statistics education, rather than working upfront. But I feel very honoured that people I respect have recognised not only my work — but also the importance of the field in which I work." Read the full story at stat.auckland.ac.nz/en/about/news-and-events-5/news/news-2016/2016/02/lifetime-achievement-award-for-statistics-education-leader.html.

Associate Professor *Rachel Fewster* has gained a $150,000 from the Ministry of Business, Innovation and Employment scheme Unlocking Curious Minds (curiousminds.nz/discover/article/4/30/unlocking-curious-minds) to develop an educational programme for primary-school aged children that aims to extend their skills from hands-on conservation to environmental strategy, using online data analysis tools and a computer game. The programme is called CatchIT-Schools (stat.auckland.ac.nz/~fewster/CatchIT).

For six months last year, US Fulbright Scholar to New Zealand Christine Franklin, a statistical education specialist at the University of Georgia (UGA), was hosted by the Department, where she worked closely with Associate Professor *Maxine Pfannkuch*. The stay proved a career highlight, Professor Franklin says: "Working with Maxine and other educators at the University of Auckland was the most incredible professional journey I have experienced in my 36-year academic career in higher education." Under the UGA International Faculty Exchange Grant scheme (franklin.uga.edu/content/uga-franklin-international-faculty-exchange-visits), Professor Franklin was back in New Zealand for several weeks in March, during which time she worked on a very full list of statistical education collaborations. Associate Professor Pfannkuch will be on exchange at UGA in April.

A special issue of the *New Zealand Journal of Ecology* was released in January, documenting both the history and state-of-the-art of rodent eradications in New Zealand. It followed a University of Auckland-hosted symposiumin 2014 celebrating 50 years of rodent eradications in New Zealand (science.auckland.ac.nz/en/about/our-research/rateradication.html). Dr *James Russell* from the School of Biological Sciences and Department of Statistics convened a special issue of the journal to collect important current papers on rodent eradications. The special issue was edited in association with the Department of Conservation Island Eradication Advisory Group. Read the full story at science.auckland.ac.nz/en/about/news/news-2016/2016/01/rodent-eradication-successes-documented-in-journal-.html.

New faces

Dr *Mehdi Soleymani* has been appointed to a role as lecturer in data science. Dr Soleymani completed his undergraduate and masters degrees at Shahid Beheshti University in his native Iran, and his PhD at the University of Hong Kong, where he has spent the last six years. He has come to New Zealand with his wife, Nazafarin.

Ms *Leila Boyle* has returned to the Department of Statistics after 11 years teaching statistics at the University of Aucklands Student Learning Services, which provides workshops, online resources and advice for students to develop academic skills.

Visitors

As we mentioned in the last newsletter, Professor Matthias Schonlau is visiting from the University of Waterloo. Weve since written a story about his work, aimed at a general audience, and you can read it at stat.auckland.ac.nz/en/about/news-and-events-5/news/news-2016/2016/02/digging-deeper-in-the-text-mine.html.

Retirements

Matt Regan has retired from the Department of Statistics, and *Ross Parsonage* retires in the second week of April. Associate Professors *Brian McArdle*, *Maxine Pfannkuch* and *David Scott* are moving to part-time contracts from the beginning of April.

Steffen Klaere & Julie Middleton

UNIVERSITY OF WAIKATO

DEPARTMENT OF MATHEMATICS AND STATISTICS

The merged departments of mathematics and statistics have had their first joint meeting and getting on with planning papers for the amended point values. The overall chair is *Nick Cavenagh* nickc@waikato.ac.nz with *Lyn Hunt* coordinating the statistics programme lah@waikato.ac.nz.

Congratulations to *Daniel Delbourgo* who was promoted to Associate Professor from 1 January this year. Students continue to enrol in good numbers, with a staff student ratio of 1:25 for mathematics and 1:22 for statistics.

Cecilia Flori has joined us from the Perimeter Institute for Theoretical Physics, Waterloo, Canada as a Tutor in Mathematics. She has a PhD from the Max Planck Institute and works in the area of topos theory and its applications to mathematical physics, especially quantum theory. Her interests include athletics, wherein she joins the ultra-fit members of the department.

Cecilia Flori

New programmes in Civil Engineering and Environmental Engineering have recently been approved and will start in 2017 at year 2. With over 500 students now studying Engineering at Waikato, and with civil engineering being by far the largest engineering discipline in New Zealand (Kiwis love roads!), this development has positive implications for Mathematics and Statistics.

The winds of change are blowing on the budget front. Paid parking campus wide has been implemented. Staff in many sections of the University over 60 years of age have been encouraged to retire. In addition we have a "discussion" proposal of a target staff student ratio of 1:30 for A category subjects.

Two of our recent visitors intend to return, so could be of interest to mathematical scientists outside of Waikato: these are Kerri Morgan from Monash University, who works on graph polynomials and computational graph theory and Tobias Fritz from the Max Planck Institute, where he has been working on a variety of new structures applied to information theory and the mathematical aspects of quantum mechanics. For the former please contact *Daniel Delbourgo* (delbourg@waikato.ac.nz) and the latter *Cecilia Flori* (cflori@waikato.ac.nz).

Kevin Broughan

MASSEY UNIVERSITY

INSTITUTE OF FUNDAMENTAL SCIENCES

First, we'd like to welcome some new arrivals. We are very happy to welcome Dr *Nicholas Witte* who has taken up a position as Senior Lecturer in Physics, and Dr *Graham Weir*, who has joined as an Adjunct Professor of Applied Mathematics. Shifting to a smaller length scale, *Luke and Judith Fullard* are very pleased to welcome their daughter, Libby Hannah Fullard, who was born on January 17.

David Simpson was a Simons Visiting Researcher at the Centre de Recerca Matematica (CRM) in Barcelona, Spain, from February 1 to March 4, 2016. The CRM is a centre for mathematical research that hosts researchers for training and intensive workshops. David attended the program: Advances in Nonsmooth Dynamics (a topic that seeks to understand the behaviour of dynamical systems involving switches, impacts or other abrupt features) and initiated a few new research collaborations with European-based mathematicians.

Matt Wilkins has submitted his PhD thesis on 'Geometric integration of constrained and multisymplectic Hamiltonian systems', and will defend in April. He is now teaching foundation-level maths for Massey's professional and continuing education unit.

Robert McLachlan has been hosting visitors from Chalmers University, Sweden, for seven weeks, the initial cohort under a Marie Curie exchange grant called 'CHiPS — Challenges in Preserving Structure'. Klas Modin, Geir Bogfjellmo and Milo Viviani work on different aspects of geometric integration. A feature of these visits was a research retreat at sunny Foxton Beach, a retreat now in its third year, ably organized by *Stephen Marsland*. Seminars were as follows.

- Milo Viviani: Hamiltonian models of flow on a rotating sphere.
- Geir Bogfjellmo: Interpolation in Riemannian spaces.
- Robert McLachlan: Differential invariant signatures for images.
- Stephen Marsland: Image registration with uncertain landmarks.

- Xinyuan Wu: Structure-preserving algorithms for oscillatory differential equations.
- Richard Brown: Brain stuff.
- Nicholas Witte: Some essential results in random matrix theory, and their implications for other areas of mathematics.
- Raziyeh Zarre: Multi-registration of images.
- Klas Modin: Diffeomorphic density matching by optimal information transport.
- James Benn: Riemannian PCA.

Xinyuan Wu, from Nanjing University, was also visiting having previously been in Auckland.

Extramural activities included bird watching, kite surfing, and watching kite surfing.

Richard Brown

INSTITUTE FOR NATURAL AND MATHEMATICAL SCIENCES

Winston Sweatman, *Robert McKibbin*, *Emily Harvey*, *Graeme Wake*, *Lynette O'Brien*, and *Graeme O'Brien*, all presented talks at the NZ Mathematics Colloquium in Christchurch in December. The colloquium marked the end of Winstons two-year term as President of the Society.

There was again involvement of INMS members in MISG 2016, the first of an annual series of three being held at University of South Australia in Adelaide. *Winston Sweatman* was a moderator for a problem brought by Schneider Electric. Other Massey participants were *Robert McKibbin* and *Graeme Wake*.

In the second week of February a large contingent of our institute attended the annual ANZIAM meeting in Canberra. These were: *Alona Ben-Tal*, *Carlo Laing*, *Robert McKibbin*, *Mick Roberts*, *Winston Sweatman*, *Graeme Wake* and *Jairaj Prorak*. Jairaj is an international Exchange PhD student from Thailand working with Graeme Wake until June.

Winston Sweatman travelled to Korea where he was invited to the KAIST Industrial Mathematics Initiative. From there he went on to visit a colleague in Stellar Dynamics/Celestial Mechanics in Glasgow.

Mick Roberts spent two weeks working with Hans Heesterbeek at Utrecht University. He also attended the Epidemics5 conference in Clearwater Beach Florida, and presented a poster "How epidemiology interacts with ecology". Mick is now on the editorial board of Mathematical Biosciences.

Gaven Martin travelled to the UK and Finland on a Fellowship from the Emil Aaltosen Foundation where he gave invited presentations at various conferences. He served on the US National Science Foundation Mathematics Panels in February/March.

Graeme Wake was the opening invited speaker at the IMI (Kyushu)/La Trobe conference on the Mathematical Modelling of Materials held in Melbourne. Graeme has recently been appointed as a Guest Editor for the Advances in Difference Equations thematic series for the *Proceedings of the International Conference in Mathematics and Application 2016*. The conference will be in December 2016 in Bangkok.

The Mathematics-in-Industry for NZ (MINZ) initiative was successful in gaining a large grant in partnership with the Japanese Society for the Promotion of Science for the Study Groups here : 4th July 2016,(see elsewhere in this newsletter) and the subsequent one in Kyushu/Tokyo in late July. *Graeme Wake* (Massey) and Mark McGuinness (VUW) are completing these arrangements in association with RSNZ and KiwiNet.

Laure Talarmain is visiting INMS as an intern until August. Laure is completing her Masters degree with INSA Lyon. She is working on a project modelling seasonal influenza with Mick Roberts.

We welcomed to New Zealand the 2016 Forder Lecturer Julia Gog, Reader in Mathematical Biology in the Department of Applied Mathematics and Theoretical Physics, Cambridge University. Mick Roberts and Julia Gog spoke at One Health Aotearoa, a Symposium on Infectious Diseases, in Wellington on 22/23 March. Julia then began her Forder Lecturer tour, flying to Christchurch after Easter.

Alona Ben-Tal

VICTORIA UNIVERSITY OF WELLINGTON

SCHOOL OF MATHEMATICS AND STATISTICS

The School has benefitted from the presence of a number of visitors over the last few months. The matroids group (led by *Geoff Whittle* and *Dillon Mayhew*) is a constant source of attraction - so far this year, Reinhard Diestel (Universität Hamburg), regular visitor and former post-doc Mike Newman (University of Ottawa), Steve Noble (Brunel University) and Reshma Ramadurai (University of Waikato) have been here for various periods and Steve and Reshma gave seminars. *BD Kim* hosted a visit from Cristian Virdol (Yonsei University) and *Dimitrios Mitsotakis* organised visits and talks by Sergej Flach (Massey) and Boaz Ilan (UC Merced). On the statistics side, Bryan Shepherd was this years Shayle Searle Visiting Fellow and John Hinde came up from Canterbury to give a seminar and talk to *Ivy Liu*, *Shirley Pledger* and *Richard Arnold* in relation to the Marsden project on cluster analysis for ordinal data.

The much-discussed discovery of gravitational waves by the LIGO consortium earlier in the year prompted a rapidly arranged public joint seminar by *Matt Visser* and Melanie Johnston-Hollitt (School of Chemical and Physical Sciences, VUW) in February. Matt talked primarily about the theoretical aspects of gravitational waves while Melanie concentrated on the physics and engineering of the detector and the consequences for astronomy of a completely new way of sensing the universe. Advertised with just three days notice, the seminar overflowed the university's Memorial Lecture Theatre and was enthusiastically absorbed by everyone there.

Rod Downey is a founder, with Veronica Becher (Buenos Aires, Argentina) and Denis Hirschfeldt (Chicago), of the international conference series Computability, Complexity and Randomness (CCR), first held in 2004 and an annual event since 2007. The 2016 meeting was recently held in Honolulu with Rod as a co-chair and he will co-edit the proceedings, due to appear in the journal Theory of Computing Systems. Among the invited speakers at the meeting were current SMS staff *Linda Brown Westrick* and *Dan Turetsky* — further evidence of the strength of Victoria University in this research area. A local tv show was made about the CCR conference in Hawaii and features Rod (youtube.com/watch?v=1kTtBlYbk9s).

It was a great pleasure and fitting honour that *Adam Day* was both the inaugural Butcher-Kalman Lecturer at the NZ Mathematics Colloquium at the University of Canterbury in early December was awarded the NZ Mathematical Society Early Career Award at the conference dinner. Adam's lecture, entitled "Borel graph combinatorics" was a model of exposition and very well received. The research award citation was 'for fundamental contributions to the theory of algorithmic randomness and computability including the solution of the random covering problem'.

The school farewelled post-docs *Daniel Fernandez*, who has now taken up a position at the Centre for Data Science at New York University, and *Ana Alonso-Serrano*, who has returned to Spain. In their place, we have been pleased to welcome *Greg Igusa*, working with Rod Downey, and *Daryl Funk* who is collaborating with Dillon Mayhew. We were also delighted that *David Cox*, who moved from Christchurch back to Wellington in December, has joined us as a teaching Fellow, picking up the reins from Sarah Howell in helping the stats group revamp our core STAT 193 service course. David was thrown in at the deep end, teaching the course in the summer trimester during January and February. This was the first time the course has run at that time and it proved extremely successful with around 100 students enrolled.

There was a further change of personnel in the School office: Ani Epairima moved to join the new-look Te Rōpū Āwhina whānau for Māori and Pacific students in the Faculties of Science, Engineering, and Architecture and Design. They provide an amazing support for our students so, while we were sad to lose Ani, she is still working with us. We were very lucky that *Moana Pointon* was able to take up Ani's role at very short notice. Meanwhile, Rebecca Burke whose position they are filling, gave birth to her daughter, Lotta Hineteaio, in January and we wish them and their family well.

Welcome back to *Mark McGuinness*, who has recently returned from research and study leave spent primarily in Limerick at their exceptional Mathematics Applications Consortium for Science and Industry (MACSI). Mark is in the hot seat now, first to give his inaugural professorial lecture entitled "Problems Solved" on 5 April, and then as co-chair of the MINZ study group (minz.org.nz) being held at Victoria in early July. He seems to be handling both tasks with characteristic aplomb.

Petros Hadjicostas has joined the team setting this year's NZAMT Senior Mathematics Competition. He and the team have conjured up some excellent, sometimes curly, questions that will certainly challenge the students. We are also gearing up for our annual Maths Challenge for years 10–13 students from colleges in the southern North Island. The university archive has provided us with some old exam papers from around 1900, some of which will feature in the day's competition.

Peter Donelan

UNIVERSITY OF CANTERBURY

SCHOOL OF MATHEMATICS AND STATISTICS

Congratulations to *Penelope Goode*, *Jeanette McLeod* and *Phil Wilson*, who have won last year's College Health and Safety Award. The award is for the well-being initiative they have set up in the School, a weekly 2-hour get-together each Friday where staff can socialise, crochet, fold origami, do dot-to-dot, colour something in, juggle a bit, share a skill, tell a story, or simply eat lunch and chat with colleagues. The College committee commented on their work saying, "This unique well-being activity is an excellent example of how we need to be innovative and creative to ensure we inject some team bonding and fun into our workplace activities."

Congratulations to *Blair Robertson* who was awarded the Worsley Early Career Research Award at the NZSA conference in Christchurch last year, and to *Jeanette McLeod* who was awarded the Emerging Teacher College Teaching Award for 2015.

Raazesh Sainudiin returned to the School full-time from a 1-year leave of absence spent at Wynyard Group, which further strengthened our connections with the company.

Felipe Voloch

In January *Pauline Auger* retired after just over ten years with us on the admin staff.

The School welcomed four new appointments to the continuing staff this year. *Jenny Harlow* took up a continuing senior tutor position in January. Jenny had been with us for nearly 3 years on a fixed-term contract as Senior Tutor. She is a graduate of the University of Canterbury and completed her MSc in 2013.

In February *Felipe Voloch* joined the School as Chair of Pure Mathematics. Originally from Rio de Janeiro, Brazil, he gained his Ph.D. in 1985 from the University of Cambridge, UK. Felipe has spent the last 23 years at the University of Texas at Austin. His research interests are in Number Theory and Algebraic Geometry and applications to Coding Theory and Cryptography.

Also in February *Rachael Tappenden* took up a continuing mathematics lecturing position in the School. Rachael graduated with a PhD in Mathematics from this School at the end of 2011. Since then she spent two and a half years as a postdoc with the Edinburgh Research Group on Optimisation, within the School of Mathematics at the University of Edinburgh. From mid-2014 until the end of 2015, she was a postdoc in the Department of Applied Mathematics and Statistics at Johns Hopkins University. Her research interests lie in the area of computational optimisation and numerical linear algebra, and their application to large-scale data science problems.

In March *Lucia Youn* joined the School's admin team. She is a graduate of UC and is currently undertaking further study in Law. She has also undertaken postgraduate studies in management at UC and CPIT, and has over five years experience in administration and event management. Lucia came from the university's HitLab where she had a fixed term position.

Roy Kerr, former Head of Department, was conferred an Honoray Doctorate in Science at December's graduation ceremony. Roy, who retired in 1993, is an eminent mathematician, known internationally for discovering the Kerr Vacuum, an exact solution to the Einstein field equation of general relativity. The discovery triggered a revolution in the field of astrophysics.

David Robinson, a former staff member with an involvement with the School for some 50 years, passed away in January after a brief illness, aged 79. David had research interest in graph theory and combinatorics. His long career at UC included a term as Dean of Science. Although retired years earlier David continued teaching for us until 2010.

Rachael Tappenden

Roy Kerr

In February the School welcomed three Erskine Fellows in the School. Krishnamurthi Ramasubramanian is from the Cell for Indian Science and Technology in Sanskrit Department of Humanities and Social Sciences at the Indian Institute of Technology Bombay. Originally trained as a theoretical physicist, he is teaching into our Mathematics in Perspective course, MATH380, with his expertise in the History of the exact sciences in India. He is the author of several books and many seminal articles. He is also the recipient of many prestigious awards including the Maharshi Badarayana Vyas Sammam award issued by the President of India. His research interest are in the history of mathematical astronomy and he is hosted by *Clemency Montelle*.

John Hinde from the National University of Ireland in Galway is staying with us for seven weeks. His field of special interest is methodology, computation and application of statistical modelling. John has had a long and active involvment with the Statistical Modelling Society and was one of the founding Editors of the journal Statistical Modelling. He is teaching into STAT211 and is hosted by *Carl Scarrott*.

Wolfgang zu Castell is Head of Scientific Computing Research Unit at the Helmholtz Zentrum in Munic, German Research Center for Environmental Health. He is a familiar face in the School having visited us a few times before. This time he stays with us for three months. Besides the provision of professional ICT services for all organizational units at Helmholtz Zentrum in Munic the Computing Center develops and uses mathematical and statistical methods for computer-aided analysis and simulation of biological systems. Wolfgang's research interests are in approximation theory, kernel based methods, special functions, learning with kernels. He is hosted by *Rick Beatson* and teaches into two of our higher level analysis courses, MATH201 and MATH343.

ABSTRACTS OF PHD THESES

Rachelle N. Binny, University of Canterbury

Supervisors: Michael Plank, Alex James and Matthew Simpson (QUT)

Date: January 2015

Title: **Spatial moment models for collective cell behaviour.**

The ability of cells to undergo collective movement plays a fundamental role in tissue repair, development and cancer. Interactions occurring at the level of individual cells may give rise to spatial structure, such as clustering, in a moving population. *In vitro* cell culture studies have shown that the presence of such spatial structure can play an important role in determining the dynamics of migrating cells at a population level. However, mathematical models that consider population-level behaviour often take a mean-field approach, which assumes that individuals interact with one another in proportion to their average density and neglects the effects of spatial structure.

In this work, we develop a lattice-free individual-based model (IBM) for collective movement in one-dimensional space. The IBM uses random walk theory to model the stochastic interactions occurring at the scale of individual migrating cells. In particular, our model allows an individual's direction of movement to be affected by interactions with other cells in its neighbourhood, providing insights into how directional bias generates spatial structure. As an alternative to the mean-field approach, we employ spatial moment theory to develop a population-level model which accounts for spatial structure and predicts how these individual-level interactions propagate to the scale of the whole population. The IBM is used to derive an equation for dynamics of the second spatial moment (the average density of pairs of cells) which incorporates the neighbour-dependent directional bias and we solve this numerically for a spatially homogeneous case.

Extending our model to consider cell behaviour in two-dimensional space makes it more amenable for use alongside experimental data. Using imaging data from

in vitro experiments, we estimate parameters for the two-dimensional model and show that it can generate similar spatial structure to that observed in a 3T3 fibroblast cell population. Finally, we incorporate cell birth and death into our two-dimensional model to consider how these processes give rise to spatial structure and how, in turn, this spatial structure affects the collective dynamics.

Günter Steinke

UNIVERSITY OF OTAGO

DEPARTMENT OF MATHEMATICS AND STATISTICS

Alex Vilenkin, a world-leading cosmologist from Tufts University, Massachusetts, has introduced the general public to modern cosmology and extravagant concepts like multiverses in his talk "The universe beyond the horizon" at the Otago Museum. Alex has been invited by *Robert Thompson* and the Department's Relativity Group to visit Otago as part of the exhibition "Einstein — 100 Years of the Theory of General Relativity". The exhibition, which has conveyed some of Einstein's remarkable ideas with interactive exhibits, has attracted thousands of visitors in December and January.

At the right time for the above-mentioned anniversary of General Relativity, gravitational waves have been measured for the first time by the two LIGO (Laser Interferometer Gravitational-Wave Observatory) detectors in the USA. The signal from two merging black holes, which has reached Earth after a long travel of about 1.3 billion years, has been detected last September, and the discovery was officially announced in February 2016 — 100 years after Einstein first predicted these waves in 1916. A positive side effect is an increased public interest in Einstein's theory. *Jörg Frauendiener* has given a series of talks for students and the general public to explain the significance of this first direct measurement.

Astrid an Huef has taken up the presidency of the NZMS. All the best, Astrid.

Congratulations to *Vee-Liem Saw* for earning an honourable mention in the Aitken student prize competition at the NZMS Colloquium in December. In his talk, "Helicalised fractals", Vee-Liem formulated the concept of the "helicaliser", in which iteratively new windings are added to a curve in order to form a fractal. Vee-Liem is currently a PhD student being supervised by *Jörg Frauendiener* and *Jörg Hennig*.

Matt Parry has become an Elected Member of the International Statistical Institute. Congratulations, Matt!

Otago-led research by *Matt Schofield*, *Richard Barker* and colleagues from the USA and UK has featured in the Otago Daily Times. They have reconstructed summer temperatures in Sweden between 1496 and 1912 from tree ring measurements and came up with a better way to estimate the error margins, which had been underestimated in earlier studies.

We bid farewell to *Robert Thompson* who has been a postdoctoral fellow in the Department's general relativity group for six and a half years. Robert is an expert in analog spacetimes and transformation optics. His research on invisibility cloaks has recently featured at Phys.org. Robert could show that perfect cloaks are impossible as their operational frequency depends on the speed of the observer. All the best for your future, Robert!

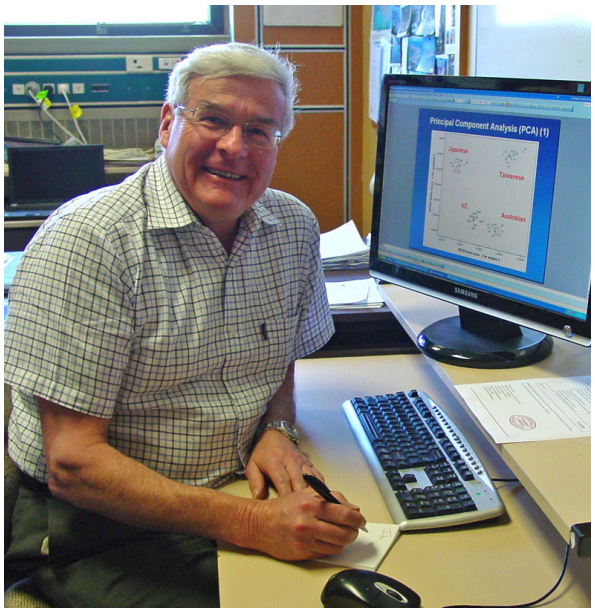
Robert "Tank" Aldred is the new Head of Department. Best wishes and good luck, Tank, for this challenging position. Moreover, many thanks to *Richard Barker*, who has been a very well-organised and considerate HoD for 8 years.

We have welcomed several new staff members: *Mohammad Ali Nilforooshan* (Postdoctoral Fellow working with BLNZG — Beef and Lamb NZ Genetics), *Diana Giraldo* (Assistant Research Fellow, also working with BLNZG), *Richard Norton* (Research Fellow), *Petru-Adrian Cioica-Licht* (Postdoctoral Fellow), *Graham Wood* (Senior Lecturer, fixed term), and *Katrina Sharples* (Associate Professor, who was here before, but is now a permanent staff member).

Congratulations to *David Bryant*, who, together with colleagues from Massey, Germany, France and the UK, received a $150,000 Catalyst grant from the Ministry for Business, Innovation & Employment. Their project will study climate change adaptation in alpine and sub-Antarctic Island plants, which is "an ideal test bed for developing knowledge of the natural evolutionary processes that should be incorporated into global management programmes seeking to minimize biodiversity loss under rapid climate change."

We have celebrated *John Harraway's* remarkable anniversary of 50 years teaching at this university. John has been lecturing in this Department since 1966! John has research expertise in statistics education, statistics software development for schools and applied statistics. He was awarded the Campbell Award from the NZ Statistical Association in 2013 for "diverse and outstanding professional leadership in statistics education and promotion of statistics". In 2010 his superb, experienced teaching was recognized with a University of Otago Teaching Excellence Award. John has been a Past President of the International Association for Statistical Education (2011-2013), Chair of the Advisory Board of the International Statistical Literacy Project (2011-2013), and he is an Elected member of the International Statistical Institute (since 2002). Over the years, John has taught thousands of students and is remembered by many students that he introduced to

statistics in their first and second years of studies. Congratulations, John, and all the best for the next decade at this university!



John Harraway

Congratulations to *Richard Norton* and his wife Janet on the birth of their second child. The healthy baby girl is named Maria Olive and had a birth weight of 8 pounds. All the best for the happy parents! May they remain happy after numerous sleepless nights...

Visitors

Mark Kayll (University of Montana, USA) is here for several months on his sabbatical. Mark is working with *Robert "Tank" Aldred* on various combinatorial problems.

Another visitor of Tank's is Jun Fujisawa (Keio University, Yokohama), who is visiting for two weeks to complete a collaborative research project on distance restricted matching extension in planar graphs. Tank and Jun have been working together for 10 years now and enjoyed a very productive visit to date.

Francesc Fàbregas Flavià (École Centrale de Nantes, France) is visiting for five weeks. Francesc is a PhD student working on numerical modelling of wave energy farms. Together with *Fabien Montiel* he is developing mathematical tools to predict the influence of wave energy farms on the nearshore wave climate.

Genevera Allen (Rice University and Baylor College of Medicine, USA) was jointly a guest of Maths & Stats, Preventive & Social Medicine, Biochemistry, and Information Science for a couple of days in March. Her research focuses on developing statistical methods to help scientists make sense of their 'Big Data' in applications, and her work lies in the areas of modern multivariate analysis, graphical models, statistical machine learning, and data integration or data fusion. Genevera was quite busy giving four talks during her short visit.

ABSTRACTS OF PHD THESES

Zahra Afsar, University of Otago

Supervisors: Astrid an Huef and Iain Raeburn

Date: 2016

Title: **Equilibrium States on Toeplitz Algebras**

This thesis describes the equilibrium states (the KMS states) of dynamical systems arising from local homeomorphisms. It has two main components. First, we consider a local homeomorphism on a compact space and the associated Hilbert bimodule. This Hilbert bimodule has both a Toeplitz algebra and a Cuntz-Pimsner algebra, which is a quotient of the Toeplitz algebra. Both algebras carry natural gauge actions of the circle, and hence one can obtain natural dynamics by lifting these actions to actions of the real numbers. We study KMS states of these dynamics at, above, and below a certain critical value. For inverse temperature larger than the critical value, we find a large simplex of KMS states on the Toeplitz algebra. For the Cuntz-Pimsner algebra the KMS states all have inverse temperatures below the critical value. Our results for the Cuntz-Pimsner algebra overlap with recent work of Thomsen, but our proofs are quite different. At the critical value, we build a KMS state of the Toeplitz algebra which factors through the Cuntz-Pimsner algebra.

To understand KMS states below the critical value, we study the backward shift on the infnite path space of an ordinary directed graph. Merging our results for the Cuntz-Pimsner algebra of shifts with the recent work about KMS states of the graph algebras, we show that Thomsen's bounds on of the possible inverse temperature of KMS states are sharp.

In the second component, we consider a family of $*$-commuting local homeomorphisms on a compact space, and build a compactly aligned product system of Hilbert bimodules (in the sense of Fowler). This product system also has two interesting algebras, the Nica-Toeplitz algebra and the Cuntz-Pimsner algebra. For these algebras the gauge action is an action of a higher-dimensional torus, and there are many possible dynamics obtained by composing with different embeddings of the real line in the torus.

We use the techniques from the first component of the thesis to study the KMS states for these dynamics. For large inverse temperature, we describe the simplex of the KMS states on the Nica-Toeplitz algebra. To study KMS states for smaller inverse temperature, we consider a preferred dynamics for which there is

a single critical inverse temperature, which we can normalise to be 1. We then find a KMS-1 state for the Nica-Toeplitz algebra which factors through the Cuntz-Pimsner algebra. We then illustrate our results by considering different backward shifts on the infnite path space of some higher-rank graphs.

Richard McNamara, University of Otago

Supervisors: Iain Raeburn and Astrid an Huef

Date: 2016

Title: **KMS States of Graph Algebras with a Generalized Gauge Dynamics**

The goal of this thesis is to study the KMS states of graph algebras with a generalised gauge dynamics.

We start by studying the KMS states of the Toeplitz algebra and graph algebra of a finite directed graph, each with an a generalised gauge dynamics. We characterise the KMS states of the Toeplitz algebra and find an isomorphism between measures and KMS states at large inverse temperatures. When the graph is strongly connected we can describe all of the KMS states, and we get a unique KMS state at the critical inverse temperature. Viewing the graph algebra as a quotient of the Toeplitz algebra we describe the KMS states of the graph algebra.

Next we study the KMS states of graph algebras for row-finite infinite directed graphs with no sources and the gauge action. We characterise the KMS states of the Toeplitz algebra and discuss KMS states at large inverse temperatures. We then show that problems occur at the critical inverse temperature.

Lastly we study the KMS states of the Toeplitz algebras and graph algebras for higher-rank graphs with a generalised gauge dynamics, using the same method as we did for finite graphs. We finish by studying the preferred dynamics of the system, where we get our best results.

Jörg Hennig

OBITUARIES

Marin Segedin, 1922–2016

Picture from Murray Thompson's collection

Marin Segedin, the twelfth permanent appointee to the academic staff of the Department of Mathematics at Auckland University College, died at the age of 93 on 24 January, 2016. After 20 years as lecturer and senior lecturer in the Department he transferred to the Universitys Liaison Office (with Secondary Schools) before retiring from the University as Liaison Officer at the end of 1984.

Marins father migrated to New Zealand from the island of Korcula, off the coast of Croatia, leaving behind a wife and son Marin, the intention being that they would follow him once he settled in. However, his wife died and the son never migrated to New Zealand. Segedin senior remarried in New Zealand and raised a new family, starting with Cecil (middle name Marin) then, seven years later, Marin himself. Marin attended Auckland Grammar School and Auckland University College where he completed a Master of Science degree with first class honours in Mathematics in the 1940s. He was then appointed as a Lecturer in Mathematics in 1949, joining his older brother in the Department. Some years later he took leave of absence to complete a Master of Arts degree in Mathematics at Indiana University in the USA.

As a lecturer at Auckland he taught a wide range of courses from first year to graduate, from basic algebra and trigonometric identities through 3-dimensional dynamics to complex analysis: I had him as a lecturer on the latter two topics, and still have the notes I took more than half a century ago.

At the time I was a student, and for years before and after, for some reason the Department offered three stages of Pure Mathematics (I, II and III) units but only two of Applied Mathematics (I and III); a unit was one eighth of a BSc or one ninth of a BA, so represented a big chunk of work. In order to enrol in Applied Mathematics III a student had to have passed Pure Mathematics II and Applied Mathematics I. When I was a student in the early 1960s it was not uncommon for a fresher who had done well enough at Secondary School to be allowed to enrol directly in Pure Mathematics II so a bunch of enthusiastic second year students joined a bunch of third year students in Applied Mathematics III. The year I took Applied Mathematics III there was a third bunch: apparently they had had a tough final examination in Applied Mathematics III the previous year and quite a few were back to take the unit a second time. My first introduction to Marin as a lecturer was in this class where he sternly told us that the many students repeating the course had not worked hard enough the previous year, that Applied Mathematics III was hard and that we had to work hard if we wanted to pass. Then he proceeded to share his great knowledge of the subject. Apparently the previous decade a somewhat undercover Applied Mathematics II unit was offered. If you were lucky to hear about it then you might attend the lectures but there was no formal enrolment, examination or credit. Garry Tee and John Butcher have both told me that they found out about and attended these lectures, in which Marin was one of the prominent lecturers. By the time I came along a decade or so later either it had ceased or become even more underground but perhaps the third bunch above would have benefited from it.

Marin had an amazing memory. When I was a student, class attendance was compulsory and at every lecture a class roll was passed around with those in attendance expected to sign the roll: if you didn't sign enough times then you were not allowed to sit the final exam. Sometimes youd sign for an absent friend. One of my friends reported that he went to visit Marin after a class to discuss something. Marin asked him to wait a bit while he checked the roll because there were more signatures than students present. It wasn't long before he identified from the first year class of nearly 200 which student was signed for but absent, and this was early in the year.

When in 1965 I was appointed a junior lecturer Marin was there to give me the benefit of his wisdom and helpful advice on lecturing, and I remain ever grateful for his help through those first few challenging months.

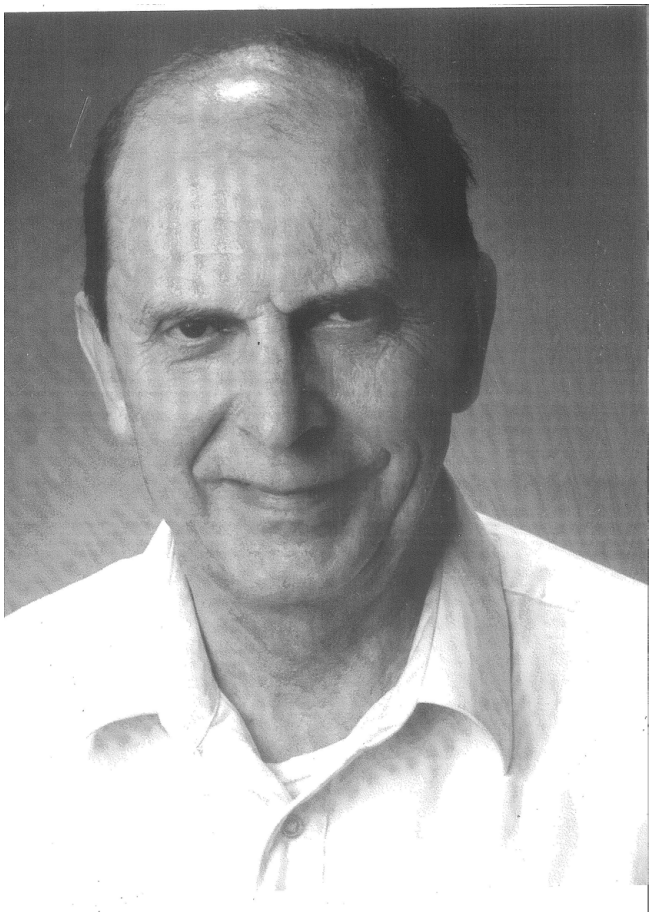
Marins style suited him well to the role of Liaison Officer, a job he also enjoyed. He also served as the Universitys Esquire Bedell, with the dignity demanded of the position.

Read what you like into this paragraph. HG Forder, for whom the Forder Lectureship is named, had an extensive collection of mathematics books, most of which he gave to the University Library on his retirement. However, he retained his favourites until his death when they also were bequeathed to the Library. One day I noticed these books cluttering the office of the librarians at the local branch of the Library and offered some space in the Mathematics Department for them until they could be catalogued, an offer readily accepted and the books respectfully moved. After a few weeks word came down from the head Librarian that there was no way that Library books should be stored outside the Library and they should be retrieved forthwith. The branch librarian despatched a couple of her staff with a trolley to repatriate the books but before they could get there the lift broke down and refused to work again until they took their trolley back. They persevered several times and each time got closer to their goal but finally stalled with a trolley full of books and two dead lifts, so the trolley had to be parked in the office where the books were temporarily stored. A few days later I related the story to Marin, one of the trustees of the Forder estate. Marin looked skyward and intoned something like 'let them go, Forder, they will be safe.' After that the lifts were compliant, allowing the two or three return trips for all of the books.

Marin was also an enthusiastic tramper from his student days when he helped build the young Auckland University (College) Tramping Club. Captain of the Club in 1948 and President in 1949-1954, he was elected a Life Member in 1949. He still took a paternal interest in the tramping club for years afterward and there I encountered him many times. I had the honour of helping him tramp up the Pararaha gorge on what he expected to be his last trip there about 20 years ago.

David Gauld

Boris Pavlov, 1936–2016



Boris was born in Kronstadt near St. Petersburg, Russia, 27 July 1936. He started his studies at Leningrad University, Faculty of Physics, and graduated in 1958. His PhD was in Mathematical Analysis (Leningrad University 1964) on Spectral Investigation of the Non–self–adjoint Operator $y'' + qy$, and he received his DSc at Leningrad University on Dilation Theory and Spectral Analysis of Nonselfadjoint Differential Operators. Joining the Physics Faculty, Leningrad University in 1961 and becoming a full professor in 1977, Boris served three years as Vice–Rector of Leningrad University (1978–1981).

He held a personal chair at Auckland University at the Department of Mathematics from 1994 to 2007, and served as Head of the Quantum Networks Group at the Vladimir Fok Institute for Physics, St. Petersburg University, since 1995. Boris became a Fellow of the Royal Society of New Zealand in 2004 and a member of the Russian Academy of Natural Sciences in 2010. He joined the newly–formed Institute for Advanced Study at Massey University Albany in 2009, and being interested in the nature of the chemical bond he became a member of our research centre in 2014.

Boris's research areas were many-fold, e.g. in Spectral theory of singular differential non-selfadjoint operators, Riesz-basis property of exponentials on a finite interval, operator-theory interpretation of critical zeros of the Riemann zeta-function, symmetric functional models for dissipative operators, zero-range potentials with inner structure and solvable models, theory of shift operators on a Riemann surface, modified analytic perturbation procedures for operators with eigenvalues embedded into a continuous spectrum, fitting of zero-range solvable model of a quantum network based on rational approximation of the Dirichlet-to-Neumann map of the original Hamiltonian, fitted solvable models of the stressed tectonic plate (predictions of powerful earthquakes), quasi-relativistic dispersion and high mobility of electrons in Si-B sandwich structures, theoretical interpretation of the low-threshold field emission from carbon nano-clusters, and lately on mathematical models for chemical bonding.

We will all miss Boris as a member and lively contributor to many discussions in our research centre. Boris leaves behind his wife Irina, a daughter and a son.

Peter Schwerdtfeger

Recollections of Boris Pavlov

Boris was a fascinating Russian Mathematician of the old style with a wide ranging appreciation of mathematics and the ability to bring out the best in good students and colleagues. Here, the old style means they simply knew a lot of stuff across a broad spectrum. I know I learnt a lot, usually with a graduate student as an intermediate as wed try and figure out afterwards what Boris had been talking about for the last couple of hours (typically a minimum period). This had the unfortunate side effect of me appearing to be knowledgeable in the area and so him talking at a higher level (for even longer). Boris and I wrote about 10 papers together (only four in Mathematics Journals, and a couple still in the works). Our collaborations started seriously with our joint Marsden (2009–2012) on a well known conjecture by Smilansky: roughly — identify the physically measurable internal properties of an object from the scattering properties of its boundary. We made good partial progress — in fact solved the problem when phrased in terms of the Neumann-to-Dirichlet map, instead of the actual problem of the Dirchlet-to-Neumann map (but thats mathematics). MathSciNet lists over 160 publications,but misses a good number of his papers in physics where he published on such things as earthquakes and pendulums! I remember a two hour lecture in my office on the Wilberforce pendulum, and got him out of my office only with a promise to buy one (which I have yet to do) and to study the YouTube video (which I did — there are many).

Boris has only five PhD students listed on the genealogy project, Mark Harmer at the University of Auckland was his last in 2000. In fact he played a major role in the supervision and mentorship of many more — of note from his times at the University of Auckland are Rowan Killip (now at UCLA) and Simon Marshall (now at Northwestern). Although not always apparent, he cared deeply about students. Not only what they were taught but also how they were taught. He had his own views on the value of different parts of mathematics too, which he was not afraid to express and certainly didnt endear him to everyone. For instance read between these lines from the introduction to his most cited paper on solvable models "The role of explicitly-soluble models in physics is universally recognized, with the attention ... growing in recent years. Unfortunately, the simplicity of a model usually turns out to be a monotonically decreasing function of its practicability." I personally really miss Boris and his enthusiasm for life and for mathematics which he held close until the end. We were enthusiastically discussing a Marsden project (as we all do in January) about 36 hours before his death.

Boris's CV is available from nzias.ac.nz/Docs/BorisPavlov/BorisPavlov_CV.pdf

Boris lecturing at the von Neumann Centenary conference

Gaven Martin

REPORTS ON EVENTS

BIRS Workshop on Viscoplastic Fluids: From Theory to Application

Given how quickly the concept of mathematical research stations la Oberwolfach has spread across all continents, intensive workshops that bring together the leading experts from a well-defined field have obviously proven to be a very successful format. Thanks to generous support from an NZMS Gloria Olive Student Travel Grant, I had the opportunity to participate in one such workshop myself.

During the last week of October 2015, the Banff International Research Station in Alberta, Canada, was hosting about 40 mathematicians and engineers to facilitate the exchange of knowledge and ideas on the topic of viscoplastic fluids. These non-Newtonian fluids, which exhibit properties of both viscous liquids and plastic solids, give rise to a number of mathematical challenges. On top of the inherent nonlinearity of the Navier-Stokes equations and the very large scale of typical flow problems, viscoplastic materials introduce additional difficulties due to their nonsmooth constitutive relations. As a result, three-dimensional computational simulations for problems of realistic complexity are still unfeasible in practice.

In many talks and discussion groups on numerical aspects it became clear how crucial it is to bridge this gap between our desire for such computational solutions for viscoplastic flows, and the unsatisfactory state of the art. A number of questions arose during the workshop: How to address the nonsmoothness of viscoplastic flow problems: by using smoothed approximations or by applying fast proximal gradient methods from convex optimisation? How to combine model reduction techniques such as adaptive mesh refinement or proper orthogonal decomposition with such algorithms? How to optimise the computational implementation with highly efficient solvers and massively parallel computing so that the solution of large-scale problems becomes viable? The computational community is hoping to provide answers to these questions until the next meeting in this series of workshops on viscoplasticity, to be held in New Zealand in late 2017.

As an adherent of numerical solutions that can do without regularisation or smoothing, I discussed a key result of my PhD project in my talk: by taking inspiration from recent acceleration techniques for optimisation algorithms in signal and image processing, I presented how a simple modification speeds up state-of-the-art algorithms for viscoplastic flow problems. Analytical results prove a higher rate of convergence, which is reflected in computing times that can be decreased by several orders of magnitude. A video of this presentation is available online at birs.ca/events/2015/5-day-workshops/15w5071/videos/watch/201510271210-Treskatis.html.

Before I attended the workshop, I had recognised most participants' names as they also occur in the references for my thesis. Without any doubt, meeting these scientists in person was one of the greatest benefits I took home from this workshop. Given how far apart we normally live, in Ecuador (J C de los Reyes, S Gonzlez Andrade), Canada (I Frigaard, A Wachs) or France (P Saramito), the meeting in Banff was clearly a unique opportunity for expanding professional networks. Besides these new contacts, the wealth of knowledge, and the stimulation for further research, I also brought an offer for a postdoctoral position back to New Zealand. In June/July 2016, I am planning to move to Vancouver with the objective to answer at least some of the aforementioned questions with collaborators at the University of British Columbia. Thank you very much, indeed, NZMS, for offering these many opportunities!

Timm Treskatis (PhD student, University of Canterbury)

New Zealand Mathematics and Statistics Postgraduate conference 2015

The 9th annual New Zealand Mathematics and Statistics Postgraduate (NZMASP) conference was held at Suncourt Hotel and Conference Centre in Taupo from the 17–20 November 2015.

NZMASP is a student-run and organised conference this year attended by 57 students from Honours, Masters and PhD programmes from universities across New Zealand. This is a great opportunity for PhD students to network with their fellow postgraduates.

Talks given at NZMASP15 were well prepared, interesting and of an excellent standard. Attendees gained valuable experience ahead of bigger events such as the NZ Mathematical Society Colloquium and the joint conference of the NZ Statistical Association and Operations Research Society. The large variety of topics ranged from General Relativity to Geometries on a Torus. Around a third of the talks were in each applied mathematics, pure mathematics and statistics.

Congratulations go to the winners of the people's choice prizes for best talks, awarded to Duy Ho (University of Canterbury) for Best Pure Mathematics Talk, Roy Costilla (Victoria University) for Best Statistics Talk and Timm Treskatis (University of Canterbury) for Best Applied Mathematics Talk. The Best Overall Talk went to Deloshan Nawarajan (Victoria University). Honorable Mentions went to Johannes Mosig and Lisa Hall.

In addition to the student presentations there were three excellent plenary talks given by speakers from the Waikato region: Dr Vanessa Cave on statistical modelling in the real world, Dr James Hutchinson on industrial mathematics, Dr Reshma Ramadurai on life as a postdoctoral researcher and Daniel Delbourgo on algebraic number theory.

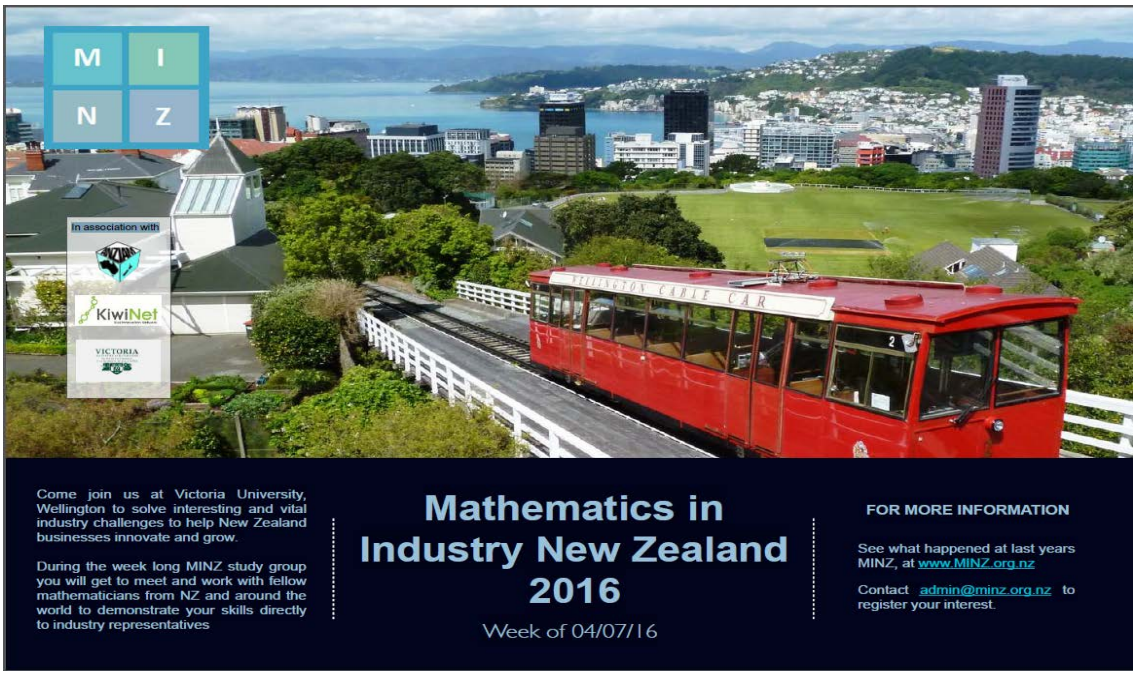
The organisers this year were Paul Brown, Liam McMahon, Chris King and Nick Lim from the University of Waikato. The conference was made possible due to the generous support of NZMS, ANZIAM, Math Works and the NZSA. Accordingly, we were able to keep registration fees as low as possible and students were able to attend with additional support from the local mathematics and statistics departments at the Universities of Auckland, Waikato, Canterbury and Otago, Victoria University and Massey University.

The baton has been handed to PhD students from the University of Otago who will organise next year's NZMASP conference.

Liam McMahon

GENERAL NOTICES

Mathematics-in-Industry New Zealand Study Group 2016



The second annual workshop in this series is to be held at Victoria University of Wellington from 4–8 July 2016. This workshop is designated as being joint between the Institute of Mathematics for Industry, Kyushu in Japan and MINZ in New Zealand via the Japanese Society for the Promotion of Science and the Royal Society of NZ.

It will be co-chaired by Professor Emeritus Graeme Wake (Massey University, Auckland) and Professor Mark McGuinness (Victoria University of Wellington). It will be organised in partnership with KiwiNet, which is a consortium of Universities and Crown Research Institutes in New Zealand focused on transforming clever science into commercial value. All members, and especially students and teachers, are invited to attend, and there are no fees. Some meals will be provided. It is expected there will be six industrial problem challenges to explore and there will be grants available on application to student participants from outside of Wellington. Information is on the MINZ website (minz.org.nz) and you are invited to register your interest at admin@minz.org.nz.

Further information is in the YouTube video youtube.com/channel/UCBdlFHZ1WA4kiy3WQABUGjA.

Graeme Wake

MATRIX — a new international mathematical research institute in Australia

MATRIX (matrixatmelbourne.org.au) was established in 2015 through the combined support of the ARC Centre of Excellence of Mathematical and Statistical Frontiers (ACEMS), the School of Mathematics and Statistics, the Faculty of Science and the Deputy Vice Chancellor (Research) of The University of Melbourne. The main aim of MATRIX is to offer a dedicated venue to enable Australian and international researchers and industry partners to collaborate on research problems in the mathematical sciences and their applications to science and industry, similar to well known examples such as Banff, Oberwolfach, MSRI and the Newton Institute, to name just a few.

The main aims of MATRIX are to:

- host advanced level, research-intensive programs in the mathematical sciences;
- provide an intellectual and stimulating environment that supports collaboration;

- encourage interaction between mathematical scientists in industry and academia, and increase the impact of mathematical and statistical research.

Researchers in the mathematical sciences in New Zealand might be interested in organising a research program at MATRIX. We offer:

- meeting facilities;
- shared office spaces with individual desks for up to 20 participants;
- administrative support staff, e.g. for email correspondence with participants;
- invoicing;
- basic on-site accommodation for up to 20 participants per day of the program;
- partial cost of meals;
- partial travel support.

We currently have a call for programs (www.matrixatmelbourne.org.au/call-for-programs/#post-23) whose deadline has just passed (1 April), but if there is interest from New Zealand researchers they should write to me and ask for an extension.

Jan de Gier, Director MATRIX

Survey of mathematical publishing priorities

I have started a worldwide anonymous survey to shed light on attitudes in the mathematical community to various journal issues. Please fill it in if and only if you have been involved with a mathematical journal as editor, reviewer/referee, author or reader in the last three years. By "mathematical" we also mean to include theoretical computer science journals and disciplinary journals used by applied mathematicians. Essentially, any journal covered by Mathematical Reviews qualifies.

This survey is run by Mark Wilson on behalf of an international group of researchers and librarians interested in improving overall performance of the publication system in mathematics and other subjects. Its results will be made public later this year.

To participate, please visit

docs.google.com/forms/d/1r4LBUJk1VF9e4Dl4aXgS4fW-O8HR9yz1cqmXdzz0CjM/viewform?c=0&w=1&usp=mail_form_link

Mark Wilson

NZMS NOTICES

Dr Jack O Button is the winner of the 2015 Kalman Prize

The Kalman Prize is an annual prize for the best paper published in the New Zealand Journal of Mathematics (nzjm.math.auckland.ac.nz/index.php/New_Zealand_Journal_of_Mathematics) over the preceding five years. This Prize is named after John Kalman, who was one of the founders of the Mathematical Chronicle, the predecessor of the NZJM, and a leading promoter of New Zealand mathematics. The Prize is generously supported by a grant from the Margaret and John Kalman Charitable Trust. The Prize was first awarded in 2014.

The New Zealand Journal of Mathematics is pleased to announce the second winner of the Kalman Prize. Dr Jack O Button is a Fellow at Selwyn College, University of Cambridge. His research interests are in Combinatorial and Geometric Group Theory, especially properties of fundamental groups of 3-manifolds and related groups. The Prize is awarded for his paper Virtual Finite Quotients of Finitely Generated Groups, which appeared in volume 41 (2011), 1-15 (nzjm.math.auckland.ac.nz/index.php/Virtual_Finite_Quotients_of_Finitely_Generated_Groups).

The nominated paper contains many results about groups for which every finite group is a quotient of a finite index subgroup. Apart from groups mapping onto a nonabelian free group, finitely generated LERF groups containing a nonabelian free group and finitely generated groups with superexponential subgroup growth are known to have this property. Dr Button proves in particular that a semi-direct product of N by H with finitely generated N has the property if and only if one of N and H has it. There are particularly important applications to the fundamental groups of compact 3-manifolds. For instance, if such a manifold fibres over the circle with fibre of negative Euler characteristic, then any finite simple group is a quotient of the fundamental group of a cyclic cover of the manifold.

The Kalman Prize has a cash value of NZ$5000. The next award will be made in October 2016 and all papers published since 2011 are eligible for this award.

Call for nominations for the 2016 NZMS Early Career Award

This award was instituted in 2006 to reward early career New Zealand mathematicians. Criteria for eligibility are the same as for the Marsden Fund Fast-Start grants. Essentially, this means that applicants must be within seven years of confirmation of PhD with an allowance made for extenuating circumstances. The candidate will be judged on their three best papers and a two-page CV. The candidate will have completed a significant part of their research within New Zealand. They would also normally be expected to be a member of the NZMS

Nominations and applications should include the following:

- name and affiliation of candidate;
- statement of general area of research;
- two-page CV;
- an electronic copy (pdf) of each of their three best papers (the papers should be published or in press), with a clear statement of the mathematical contribution of the candidate in cases of joint authorship; and
- a Citation, of maximum 40 words, summarising the mathematical research underlying the application (it is recommended that self-applicants approach a colleague to write this Citation).

A judging panel shall be appointed by the NZMS Council. No person shall receive the award more than once. The award consists of a certificate including an appropriate citation of the awardee's work, and will be announced and presented (if at all possible) at the New Zealand Mathematics Colloquium Dinner in 2016 which this year will be at Victoria University in December.

All nominations and applications should be sent by 31 July 2016 to the NZMS President Astrid an Huef. Submissions should be made by email to astrid@maths.otago.ac.nz, stating clearly that they are for the NZMS Early Career Award.

Call for nominations for the 2016 NZMS Research Award

The annual NZMS Research Award was instituted in 1990 to foster mathematical research in New Zealand and to recognise excellence in research carried out by New Zealand mathematicians. This award is based on mathematical research published in books or recognised journals in the last five calendar years: 2011–2015. Candidates must have been residents of New Zealand for the last three years.

Nominations and applications should include the following:

- name and affiliation of candidate;
- statement of general area of research;
- a list of books and/or research articles published within the last five calendar years: 2011–2015;
- an electronic copy (pdf) of the each of the five most significant publications selected from the list above;
- a clear statement of how much of any joint work is due to the candidate;
- a Citation, of at most 40 words, summarising the mathematical research underlying the application;
- names of two persons willing to act as referees.

A judging panel shall be appointed by the NZMS Council. No person shall receive the award more than once. The award consists of a certificate including an appropriate citation of the awardee's work, and will be announced and presented (if at all possible) at the New Zealand Mathematics Colloquium Dinner in 2016 which this year will be at Victoria University in December.

All nominations and applications should be sent by 31 July 2016 to the NZMS President Astrid an Huef. Submissions should be made by email to astrid@maths.otago.ac.nz, stating clearly that they are for the NZMS Research Award.

NZMS Student Travel Grants

One of the main activities of the NZMS is providing financial support to postgraduate students in mathematics in New Zealand. Towards this aim, the Society invites applications for Student Travel Grants from students to support them presenting their research at conferences, attending workshops, and developing new collaborations. Students wishing to apply for a grant towards travel that will occur in 2016 should apply by 1 June 2016 for full consideration. Retrospective applications are not considered.

Further information about the Student Travel Grants is available on our website nzmathsoc.org.nz/?assistance.

The current version of the application form is available at nzmathsoc.org.nz/downloads/applications/NZMS_FundingApplication_2016.pdf.

NZMS Financial Assistance

Members of the NZMS may apply for financial assistance with the costs of mathematical research-related activity. This includes hosting mathematical visitors, organising conferences or workshops, and attending conferences, but any research-related activity will be considered.

Applications must be made well in advance, and retrospective applications will not be considered. Applicants should apply by 1 June 2016 for full consideration at the mid-year NZMS Council meeting. The next meeting after that will be in December 2016.

Further information about NZMS Financial Assistance is available on our website nzmathsoc.org.nz/?assistance — scroll down the page to the section on *NZMS Financial Assistance*.

The current version of the application form is available at nzmathsoc.org.nz/downloads/applications/NZMS_FundingApplication_2016.pdf.

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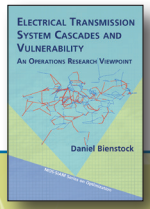

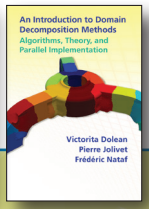

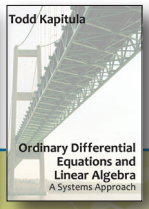

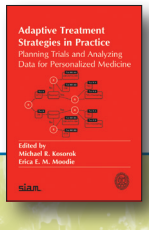

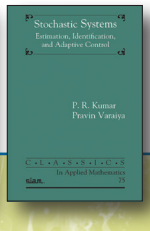

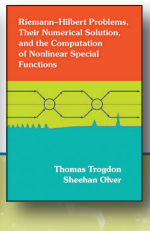

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