

Volume 44 Number 1 2017

The Australian Mathematical Society

Gazette

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- Reviews of books, particularly by Australian authors, or books of wide interest
- Classroom notes on presenting mathematics in an elegant way
- Items relevant to mathematics education
- Letters on relevant topical issues
- Information on conferences, particularly those held in Australasia and the region
- Information on recent major mathematical achievements
- Reports on the business and activities of the Society
- Staff changes and visitors in mathematics departments
- News of members of the Australian Mathematical Society

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Notes for contributors

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More information can be obtained from the *Gazette* website.

Deadlines for submissions to 44(2), 44(3) and 44(4) of the *Gazette* are 1 April 2017, 1 June 2017 and 1 August 2017.

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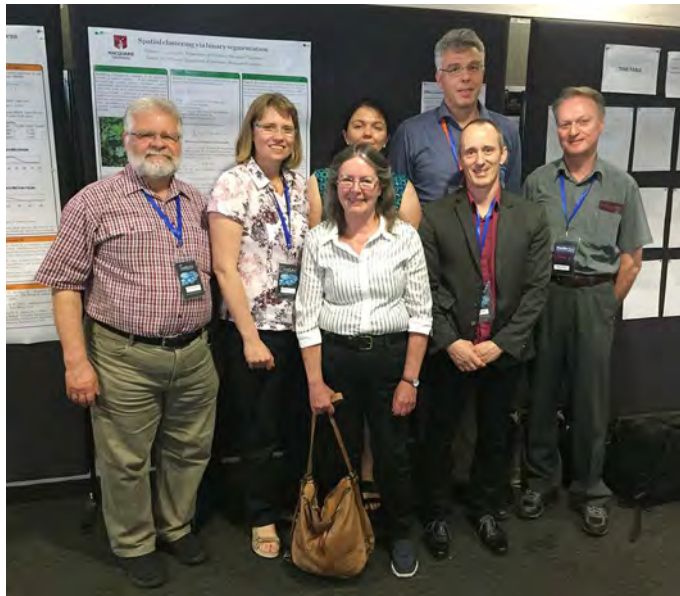


Editorial

David and I welcome you to the first issue of the *Gazette* of the Australian Mathematical Society for 2017. One cannot avoid mention of the election of Donald Trump as President of the United States of America and the impact that it may have on support for science and mathematics, and in turn how that will affect the priorities of the Australian Government. Already the Council of the Australian Mathematical Society has expressed its concern about the now repealed Executive Order on US visas and the limitation on the free flow of scientific information and scholars across borders.

The 60th Annual Meeting of the Australian Mathematical Society was held in December 2016 at the ANU. This meant that David and I would be in Canberra, and we could not miss the opportunity of meeting for the first time Eileen Dallwitz who is the very professional and experienced Production Editor of this *Gazette*. In fact, not only had we not met Eileen previously, neither had any former editors of the *Gazette*. So we arranged a meeting of all those editors present and of course had a group photo which appears below.

After these preliminaries, let me turn to the content of this issue. We have the first President's Column from Kate-Smith Miles. Kate says: "I believe that one of the roles of AustMS is to provide a forum for mathematicians to not only discuss



Back row: Sid Morris, Birgit Loch, Amie Albrecht, Jan de Gier, David Yost.
Front row: Eileen Dallwitz, Ole Warnaar.

mathematical questions, but also to debate fundamental questions about our discipline: what is the most successful way to teach mathematics in today's university environment? What is the role of mathematics in interdisciplinary applications? How can we ensure mathematics advances from interdisciplinary collaborations and industry engagements, and that we are not just merely providing a service to other fields?" And these are but a few of the questions she asks. I encourage you to read her column and to participate in these debates.

In his AMSI Director's report, Geoff Prince updates us on 2017 activities supported by AMSI. He also follows up his remarks in the last issue of the *Gazette* on the NCRIS (National Collaborative Research Infrastructure Strategy) Discussion Paper. AMSI is critical of the lack of leadership in the Draft Roadmap, which recognises advanced mathematics as an important and scarce resource, but does not offer an adequate strategy to develop this resource. Geoff includes a link to the AMSI critique on this lack of leadership.

On behalf of NCMS (National Committee for the Mathematical Sciences), Peter Forrester reports on a meeting to discuss the Decadal Plan, which took place during the 60th AustMS Meeting at ANU. And he goes on to inform us about an initiative to have Data Science introduced into the secondary school curriculum.

David Wood, Deputy Director of the Mathematical Research Institute MATRIX refers to the very successful first year of operation of MATRIX and the Programs to occur in 2017. David says that comments, suggestions and requests are always welcome.

Jan Thomas brings to our attention the Special MERGA 40 Conference 2017. MERGA (The Mathematical Education Research Group of Australia) was formed in 1976. An anniversary conference will be held at Monash University from 2–6 July, with special guest Professor McKenzie (Ken) Clements. Ken was co-founder of MERGA and organiser of the initial conference in 1977 at Monash.

Reports on several past conferences appear in this issue. In particular, Gerd Schroeder-Turk informs us about the September 2016 conference "Animal, Vegetal, Mineral", which was designed to encourage open and broad discussions between biologists, physicists, mathematicians, chemists and materials scientists.

In this issue of the *Gazette* we have two obituaries, of Anne Penfold Street and Wendy Robertson. Anne was a world-renowned researcher and I can attest to the fact that she was a very fine lecturer. I certainly benefitted from her encouragement and generosity with her time. Wendy was particularly well known for her highly cited book, co-authored with her husband Alex, on topological vector spaces. She was also an inspiring teacher, and I benefitted too from my interactions with Wendy early in my career.

On a happy note, we welcome the return of Puzzle Corner. We are grateful that Peter Higgins accepted my invitation to present Puzzle Corner in each issue. Peter is originally from Australia and now at the University of Essex. He is the inventor of Circular Sudoku, has written extensively on mathematics and won the 2013

Peano Prize in Turin for the best book published about mathematics in Italian in 2012.

Peter Stacey, AustMS Secretary, draws to our attention that nominations are called for the Australian Mathematical Society Medal and the Gavin Brown Prize, and updates us on the major Medals and other Prizes awarded during the AustMS Annual Meeting at ANU. A separate more detailed article about the major medal winners appears earlier in this issue. Peter also informs us about other events and Council decisions during the meeting.

As usual a feature of this issue of the *Gazette* is the News from Universities around the country. Reading the News is an excellent way to find out about promotions, awards, PhD completions, staff appointments and departures, books published, current and future visitors, and conferences.

Another feature of the *Gazette* are the Book Reviews. This time the review is by our experienced reviewer, Phill Schultz, of “Why is there Philosophy of mathematics?” by Ian Hacking and published by Cambridge University Press.

David and I hope you enjoy this issue of the *Gazette*.

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Sid Morris retired after 40 years as an academic. He received BSc (Hons) from UQ in 1969 and PhD from Flinders in 1970. He held positions of Professor, Department Head, Dean, Deputy Vice-Chancellor, CAO and CEO. He was employed by the universities: Adelaide, Ballarat, Flinders, Florida, La Trobe, UNE, UNSW, UQ, UniSA, Tel-Aviv, Tulane, Wales, and Wollongong. He was Editor of *Bull. AustMS* and *J. Research and Practice in IT*, and founding Editor of *AustMS Lecture Series* and *J. Group Theory*. He has been on the Council of AustMS for 25 years and its Vice-President. He received the Lester R. Ford Award from the MAA. He has published 160 journal papers and 4 books for undergrads, postgrads and researchers, plus an online book, translated into 8 languages and supplemented by YouTube videos and a Facebook group of 5,000+ members. In 2016 he edited the book *Topological Groups: Yesterday, Today, Tomorrow* and was ordained as a Rabbi.



President's Column

Kate Smith-Miles*

What a privilege it is to be the 31st President of the Australian Mathematical Society, walking in the footsteps of a collection of truly remarkable Australian mathematicians as past presidents. I have been reading about the history of the society in Graeme Cohen's fascinating book *Counting Australia In: The People, Organisations and Institutions of Australian Mathematics*. Sixty years ago, when AustMS was formed, mathematics departments were certainly a very different world. There is much we can learn from considering the history of our discipline, understanding how we have reached today's environment, and pausing to reflect upon the implications for our future trajectory. While the field of mathematics is very old, our context is continually evolving, and it is timely for us to start thinking about the next 60 years.

I believe that one of the roles of AustMS is to provide a forum for mathematicians to not only discuss mathematical questions, but also to debate fundamental questions about our discipline: what is the most successful way to teach mathematics in today's university environment? What is the role of mathematics in interdisciplinary applications? How can we ensure mathematics advances from interdisciplinary collaborations and industry engagements, and that we are not just merely providing a service to other fields? What should be the role of mathematics teaching in newer degrees such as data science? How can we modify mathematics degrees to produce the kind of graduates that industry tells us they seek without diluting mathematical content? What is the definition of 'good mathematics' in a 21st century context, especially with more porous boundaries between fields? How do we support stronger gender equity in the mathematical sciences, and tackle the many perception issues that limit our pool of future mathematicians? How do we better engage with the many mathematically trained people working in industry, as well as those working in other disciplines within university and research institute environments? And of course, how do we continue to protect the need for fundamental research in an environment increasingly focused on reporting short-term engagement and impact? There are many topical questions like these that need to be considered in response to current challenges. Open debate, and sharing of best practice will benefit our discipline, and I look forward to providing opportunities for such debate within the society during my term as President.

My background as an applied mathematician with much interdisciplinary experience, as well as a former Head of a School of Mathematical Sciences, has given me a certain perspective. I believe it is possible to set strategic directions that simultaneously balance the advancement of new fundamental mathematics, while highlighting the impact of existing mathematics—and need for new mathematics—through interdisciplinary and industry engagement. Sixty years ago, these issues were of less concern, but moving forward they have now

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become paramount. It is vital that we can articulate a position and support strength and balance across the mathematical sciences — pure, applied, statistics, and interdisciplinary/translational mathematics — for the benefit of the discipline as a whole.

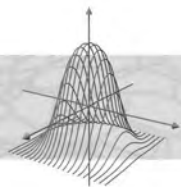
As the impact of mathematics becomes more recognized in many fields, so too we have seen challenges to the role of university mathematics departments as sole custodians of mathematical knowledge. Indeed, there are many excellent mathematicians and statisticians employed at universities in other departments such as biology, computer science, economics, and engineering who are still engaged in mathematical work, but have lost touch with the discipline. In addition to expanding reciprocal agreements between AustMS and like-minded overseas societies, this year we will also be seeking to grow AustMS membership through reciprocal agreements with other Australian societies in '01' fields such as mathematical biology, statistics, mathematical physics, and operations research. Harnessing the collective mathematical talent pool in Australia, including mathematically trained industry practitioners, will make the Australian Mathematical Society richer for its increased breadth of perspective.

Related to a focus on diversity, I am delighted that Professor Aidan Sims has volunteered to chair a working group to examine the London Mathematical Society's 'Good Practice Scheme' for gender equity and adapt it for an Australian context, also ensuring that all society processes conform to this best practice.

I'd like to end by thanking Professor Tim Marchant, as immediate Past President, for his outstanding work on behalf of the society, as well as our remarkable volunteers Dr Peter Stacey (Secretary) and Dr Algy Howe (Treasurer). I am delighted that my Presidency will continue to benefit from their support and experience, and that Tim will remain as Chair of the Membership and Marketing Committee, guiding us as we seek to grow membership. Critical to that process is to develop an understanding of how members perceive that the society can best support them. I look forward to hearing from any of you who would like to share your thoughts about how the Australian Mathematical Society can best support you as mathematicians into the future.



Kate Smith-Miles is a Georgina Sweet Australian Laureate Fellow, Professor of Applied Mathematics at Monash University, and inaugural Director of the Monash Academy for Cross & Interdisciplinary Mathematical Applications (MAXIMA). She was Head of the School of Mathematical Sciences at Monash from 2009–2014. She is member of the ARC College of Experts, Chair of the Advisory Board for the AMSI Choose Maths program, serves on the MATRIX Advisory Board, and is a member of the Federal Government's Knowledge Nation 100 group. Kate is a Fellow of the Australian Mathematical Society, and Fellow of Engineers Australia. She was awarded the Australian Mathematical Society Medal in 2010 and the EO Tuck Medal from ANZIAM in 2017.



Puzzle Corner

Peter M. Higgins*

Welcome to the Australian Mathematical Society *Gazette's* Puzzle Corner number 46. Each Puzzle Corner will contain one or more puzzles aimed to intrigue and/or entertain our readers. We shall provide a solution in a subsequent issue of the *Gazette*.

In April 2015 a logic puzzle from the Singapore and Asian School Mathematics Olympiad was posted on Facebook by the Singapore TV presenter Kenneth Kong. *Cheryl's Birthday* went viral, becoming an instant source of amusement and consternation around the globe, with angry parents claiming that their children had been subjected to what was plainly an impossible problem. Of course it was not impossible, but it was, by anyone's standards, very tricky although its nature was not entirely new.

The novel aspect to the puzzle is that people can make inferences from knowing that other people absolutely cannot make other deductions. This type of trick has been around for a long time. I first remember seeing a problem of this kind in the classic books of Martin Gardner in the 1960s. The peculiar feature of the puzzle is that a key piece of information is that one of the listeners states 'I cannot find the answer'. The critical point that you, the puzzle solver must take on board is to interpret this literally. The speaker is not merely saying that he is not clever enough to work out the answer but rather that given the information that he has to hand, the solution is not unique. You then exploit the fact that from the viewpoint of this listener there are multiple solutions to help you find the one true answer.

How can this be possible? Perhaps the simplest example of knowing because you know others don't know is the joke about three logicians that walk into a bar. The barman asks them, 'Do you all want a drink?' The first says, 'I don't know', as does the second, whereupon the third logician answers 'Yes'. The third logician deduces that each of the first two must want a drink because, if either of them did not, they would have known that the answer to the barman's question was 'No' and would have said so. Since they did not, they must both want a drink and, since the third logician evidently also wants one, he knows that answer to the question. (As he equally would if he did not want one.)

Having been forewarned therefore let's move to an example that is reminiscent of *Cheryl*.

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Alex and Barbara are trying to guess Caroline's birthday, which she tells them is one of the following ten dates:

March 29, 30, 31

July 8, 11

August 27, 30

December 8, 27, 29.

She then teasingly whispers to Alex the correct month, and to Barbara the correct day for her birthday and tells them that she has done that.

Alex then says, 'I don't know Caroline's birthday, but I *do* know that Barbara doesn't know.'

To which Barbara responds, 'I didn't know Caroline's birthday, but now I do!'

Finally, Alex then concludes, 'In that case, I now know it too!'

When is Caroline's birthday?



Peter Higgins is a Professor of Mathematics at the University of Essex. He is the inventor of Circular Sudoku, a puzzle type that has featured in many newspapers, magazines, books, and computer games all over the world. He has written extensively on the subject of mathematics and won the 2013 Premio Peano Prize in Turin for the best book published about mathematics in Italian in 2012. Originally from Australia, Peter has lived in Colchester, England with his wife and four children since 1990.



Communications

AustMS Medals

The Australian Mathematical Society honoured four of Australia's leading mathematicians in Canberra on 5 December 2016, at the opening ceremony of the AustMS 60th annual meeting. AustMS President Professor Tim Marchant congratulated the year's winners of the Medal of the Australian Mathematical Society, George Szekeres Medal (only awarded in even years) and Gavin Brown Best Paper Prize, and thanked them for their contributions as original thought leaders at the cutting edge of Australian and global mathematical science.

"Each of this year's winners has made their own indelible mark on mathematical discovery, deepening understanding of their fields and helping foster a repository of new talent to support mathematical innovation into the future," said Professor Marchant.

The presentation of the medals was followed by short talks by the winners.

AustMS Medal: Professor Aidan Sims

As this year's AustMS Medal recipient, Professor Aidan Sims from University of Wollongong (UOW) was recognised for his outstanding research as a member under 40. Aidan is recognised for his contributions to functional analysis and operator algebras, in particular the theory of higher-rank graph C^* -algebras. Most recently he has co-authored papers proving that all Kirchberg C^* -algebras have nuclear dimension 1. He has also been active in fostering new talent through research training, and directs UOW's Mathematical Sciences Research Cluster.

"This recognition by the AustMS at this stage of my career is extremely humbling. The Society is an instrumental force in fostering national and international mathematical ties, deepening engagement between different fields of mathematics, and championing gender equity in the mathematical sciences" said Professor Sims.

Joint George Szekeres Medal Winners: Professor Jim Hill and Professor Gustav Lehrer

The George Szekeres Medal was awarded jointly to Professors Jim Hill and Gustav Lehrer for their sustained outstanding contribution to research in the mathematical sciences. Both medallists also have an excellent record of promoting and supporting the discipline.

Professor of Applied Mathematics at the University of South Australia, Professor Hill is a respected leader in the field of nonlinear elasticity and the solution of difficult boundary-value problems. He has fostered the careers of over 25 PhD graduates. As well as leadership roles as ANZIAM Chair and Vice President of

AustMS, he has led world-class teams of students and researchers as Nanomechanics Group Leader at both the Universities of Wollongong and Adelaide. Thanking AustMS for the award, Professor Hill welcomed the acknowledgement of mentoring and its critical role in building long-term research capacity.

“It is heartening to see the development of new talent acknowledged and valued as a real contribution to the advancement of research and future innovation capacity,” he said

Co-recipient of the George Szekeres Medal, Professor Lehrer, a world leader in algebra and geometry, was honoured by the recognition. He was recognised for his commitment to fostering the careers of some of the nation’s most outstanding PhD students and postdoctoral researchers, including as Head of School of the University of Sydney’s School of Mathematics and Director of the Centre of Mathematics and Applications at ANU.

“I thank the AustMS for this recognition of my work and the importance of fostering and mentoring new talent. A critical focus as we strengthen innovation capacity for the future,” said Professor Lehrer.

Gavin Brown Prize: Professor George Willis

Gavin Brown Best Paper Prize winner Professor George Willis from the University of Newcastle was recognised for his outstanding joint original research paper with Yehuda Shalom, ‘Commensurated subgroups of arithmetic groups, totally disconnected groups and adelic rigidity’, *Geom. Funct. Anal.* 23 (2013) no. 5, 1631–1683.

“I thank the Australian Mathematical Society for this great honour. I am particularly pleased to receive the Gavin Brown Prize because my first job was working with him. One of the good pieces of advice that he gave me was to broaden my interests, and I think that I have followed that advice in this work,” said Professor Willis.

Mathematics-in-Industry for New Zealand 2017
Massey University, Palmerston North, New Zealand
26–30 June

Graeme Wake* and Seumas McCroskery**

Mathematics is more relevant today than it has ever been. Educators looking for ways to inspire the youth of today in the importance of maths should look no further than the Mathematics in Industry NZ study week. *Now in its third year, it is being held at Massey University, Palmerston North on 26–30 June.* The study week concept has been going now for over half a century around the world.

For fields such as Engineering and Biology, it is easy to see their influence in civilisation through bridges or phones, medicines and food. However, the field of mathematics is often invisible in real-world applications, despite being the backbone of practically everything we do. MINZ is an event which aims to promote the benefits and diverse applications of mathematics by linking mathematicians with industry problems. Many academics, students and industry representatives will converge to solve challenges from NZ industry.

This year we are extremely excited to have challenges from six leading NZ businesses, Fonterra, Zespri, Transpower, Fisher & Paykel-appliances, Sanford Ltd and the Horizons Regional Council. The last tweaks are being made to this year's challenges, which will be posted on the MINZ website soon (<http://www.minz.org.nz>). The first four of these businesses have experienced MINZ before, and keep coming back because they get such great insights and the opportunity to meet remarkable students and academics from up and down the county. We have had exceptional students participate one year, snapped up by a business and present a new challenge the next year!

To begin to see the range of topics covered at MINZ, and where mathematics is front and centre of new innovations we can look back to review a few interesting examples. The first comes from Compac, an NZ-based fruit-sorting company going from strength to strength. One of their earliest stand-out offerings was the ability to sort fruit for packaging extremely accurately. To be fair, they are talking about thousands of pieces of fruit being bounced and moved on multiple high-speed conveyor belts — not normally conducive conditions for obtaining accurate weights. The information that the mathematicians proved while at the study week provided Compac the evidence needed to build a state-of-the-art machine, supporting their efforts to be a world leader in fruit-sorting equipment.

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Fonterra has supported the use of mathematics, and the MINZ event, for many years as they have on multiple occasions found extremely useful information after posing a challenge to the MINZ group. Fonterra is continually trying to understand techniques and methodology better in order to extract higher values from its milk products. Cheese is a growing high value export but to make this workable in the volumes Fonterra works with they need to get a handle on the dynamics of the process. One challenge needed us to find a way to predict cheese quality months ahead of when it would be ready for distribution. Mathematics provided multiple models taking in all types of variables which allowed the cheese producers the information they needed to make the best decisions, providing cost savings and delivery options to maximise profits.



From white gold to whiteware: today's consumer whiteware is getting smarter and smarter. With multiple sensors, switches and connections it can be complicated to decipher the amount of information being collected and then turn that into useful results. Fisher & Paykel produce some of the most fetching and user-friendly devices in the world. One such device, used by millions of people, is the clothes dryer. We blindly throw in bunched wet clothing, flick a switch and trust that an hour later perfectly dry laundry comes out. How this happens is not magic, but mathematics. It is mathematics that provides the computer in the machines the smarts to decipher all the information being thrown at it, tracking this over time and providing the answer to stop the machine at the correct time. Fisher & Paykel challenged MINZ to obtain a solution to eliminate false cut-offs caused by bunched

clothes for a new dryer product in development, and were extremely pleased at the results, but equally, those at MINZ can look forward into walking into Noel Lemmings and knowing their smarts helped that shiny new F&P dryer stand out from the rest.

These examples only scratch the surface of the challenges at MINZ. The industrial mathematics, engineering and statistical community are keen to hear what challenges await them in June. *Registrations to attend are now open* and can be found on the [MINZ](#) website. So join us (it is free) as we further prove the relevance of mathematics in our daily lives, and show direct evidence of its worth to business, industry and society.

Special MERGA 40 Conference 2017

Jan Thomas*

The Mathematics Education Research Group of Australia was formed in 1976. An anniversary conference will be held at Monash from 2–6 July with special guest Professor McKenzie (Ken) Clements, currently in the Department of Mathematics at the State University of Illinois. Ken was co-founder of MERGA and organiser of the initial conference held in May 1977 at Monash.



Ken Clements

The organisers are trying to contact participants at the early conferences. If any *Gazette* readers are previous participants, or know of previous participants, the 2017 organisers would love to hear from you. Details at <http://tiny.cc/merga40>.

Ken has a special connection to the broader mathematical sciences community and to the foundation of AMSI. Ken was President of MERGA when the Australian Mathematical Sciences Council (AMSC) was formed under the Federation of Australian Scientific and Technological Societies (FASTS)¹ umbrella. Ken sent me along as the MERGA representative and that was my entry into the Canberra political scene. All the other societies were represented by their presidents. I can't imagine how I would have subsequently become FASTS Vice-President, AustMS Executive Officer and co-writer of the AMSI proposal and business plan without this entry to the policy arena.

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¹Now *Science and Technology Australia* (STA)

8th Australia New Zealand Mathematics Convention 8–12 December 2014

Paul Norbury*

The 8th Australia New Zealand Mathematics Convention is the combined meeting of the Australian and New Zealand mathematical societies which is held every six years. It was hosted by the School of Mathematics and Statistics of the University of Melbourne, from Monday 8 December to Friday 12 December 2014 (<http://www.austms2014.ms.unimelb.edu.au>).

The 10 plenary speakers in 2014—seven international, two from Australia and one New Zealander—are internationally renowned in their respective fields which represent a cross-section of mathematics across the world today. Five of the ten plenary speakers in 2014 were women. Such a high number of women plenary speakers has never occurred at the annual conference of the Australian Mathematical Society. This was timely in the same year that the first woman was awarded a Fields medal in mathematics. The Australian and New Zealand mathematical societies can be proud to host an international conference with such a collection of internationally renowned speakers and women. The plenary speakers were Rosalind Archer (University of Auckland, New Zealand), Maria Angélica Cueto–ECR lecturer (Columbia University, USA), Mark Gross (University of Cambridge, UK), John Hearn–ANZIAM lecturer (RMIT, Australia), Nicolas Monod (École Polytechnique, Switzerland), Jill Pipher (Brown University, USA), Bernard Nienhuis–ANZAMP lecturer (University of Amsterdam, Netherlands), Hyam Rubinstein (University of Melbourne, Australia), Nina Snaith–Hanna Neumann lecturer (University of Bristol, UK), Mariel Vazquez (UC Davis, USA).

There were 458 registered mathematicians at the meeting from 17 countries registered for a five-day program covering a wide range of topics in pure and applied mathematics and statistics. There were 16 special sessions and a poster session comprising 374 presentations including 13 keynote speakers. The special session organisers worked hard and effectively as they created a high quality meeting. Many of their efforts were inspiring and create confidence that this annual meeting can be of consistently high quality. The Australian and New Zealand Association of Mathematical Physics special interest group of the AustMS successfully held its annual meeting as part of ANZMC8. It was by far the largest of the special sessions and required its own parallel sessions.

The meeting was preceded by the AustMS Early Career Researcher Workshop held at the Melbourne Parkview Hotel in St Kilda with 93 registered participants. It was organised by Norman Do (Monash University), Andrew Francis (University of Western Sydney) and Roslyn Hickson (University of Newcastle and IBM Research, Australia) and included seven invited speakers.

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The evening program consisted of social events and public lectures. On Sunday evening the welcome reception together with registration was held at the Grand Buffet Hall at the University of Melbourne. That same evening the Women in Mathematics Dinner with 92 registered participants was hosted at the Graduate Union at the University of Melbourne by the Women in Mathematics Special Interest Group of the Australian Mathematical Society and funded and supported by an ARC Georgina Sweet Australian Laureate Fellowship to Professor Nalini Joshi. On Monday evening AMSI hosted a barbecue. On Tuesday and Wednesday evenings public lectures were delivered by Hyam Rubinstein and Thomas Barlow. The Conference Dinner was held on Thursday evening at The Atrium, Flemington Racecourse.

The conference was opened by the Head of the School of Mathematics at the University of Melbourne, Professor Aleks Owczarek. This was followed by the announcement of the award of the Australian Mathematical Society Medal to Josef Dick, and the George Szekeres Medal to Cheryl Praeger, followed by short talks by Josef Dick, Cheryl Praeger and Craig Westerland (2013 medalist).

There were 104 registered students at the conference, many competing for one of the student prizes for best talk — the B.H. Neumann Prize, Aitken Prize and A.J. Guttmann Prize. The B.H. Neumann Prize was awarded to Joshua Howie (University of Melbourne) for his talk entitled ‘A Characterisation of Alternating Knots’. Honourable mentions were given to Kamil Bulinski (University of Sydney), Inna Lukyanenko (University of Queensland), Calum Robertson (Monash University), Cameron Rogers (University of Newcastle), Tri Kyle Talbot (Monash University) and Elena Tartaglia (University of Melbourne). The Aitken Prize was awarded to Timm Treskatis (University of Canterbury) for his talk entitled ‘Accelerated Gradient Vs Primal-Dual Methods in Nonsmooth Optimisation’. Honourable mentions were given to Ilija Tolich (University of Otago) and Karen McCulloch (Massey University). The A.J. Guttmann Prize was awarded to Calum Robertson for his talk entitled ‘Newtonian Limits and the Evolution of Inhomogeneous Universes’.

The Education Afternoon on Tuesday was quite successful. It was attended by conference registrants and secondary school teachers, in all approximately 80 participants. Advertising and support for the event was aided by the generosity of MAV and AMSI. The Mathematics Education Special Session was also extremely successful. It was one of the largest special sessions at the meeting with 28 registered participants. In previous years, typical numbers for this session have been fewer than 10. In combination with the recently created Mathematics Education Special Interest Group of the AustMS this bodes well for the Mathematics Education Special Session in future years.

The conference had an income of \$185,000 and expenditure of \$145,000 including repayment of seed money back to the Australian Mathematical Society. It gratefully received support from the Australian Mathematical Society, the University of Melbourne, MASCOS, ACEMS and AMSI.

I would like to thank all of those who helped to make ANZMC8 such a great success. In particular, thanks to the Program Committee members, the special

session organisers, the local organisers, in particular Kerry Hill, the ECR workshop organisers, the staff and student volunteers in the School of Mathematics and Statistics at the University of Melbourne, John Banks for setting up the registration system; all played a vital role in the smooth running of the conference. Special thanks to the Australian and New Zealand Mathematical Societies and the University of Melbourne for supporting this conference in many ways.

The next annual meeting is being hosted by Flinders University. I wish Vladimir Ejov and his team all the best in their preparations for the 59th Annual Meeting.

Guttman 2015: 70 and Counting

Judy-anne Osborn*

The 70th birthday of Professor Tony Guttman was celebrated in late 2015 at *Guttman 2015: 70 and Counting*, <http://www.andreabedini.com/guttman2015/> held as a satellite to the Australian and New Zealand Association of Mathematical Physics annual meeting.



Tony Guttman
(photo: Jesper Jacobsen).

The meeting, held over two days at *Noah's on the Beach* in Newcastle, Australia, brought together 46 attendees including 21 presenters, speaking on aspects of mathematical physics and pure and applied mathematics that contribute towards the understanding of critical phenomena in statistical mechanics. Critical phenomena describe the emergence of macroscopic behaviour from interactions between simpler microscopic systems, and research in this area draws upon a large range of mathematical areas and tools, to many of which Professor Guttman has significantly contributed.

Research areas represented include critical phenomena, enumerative and algebraic combinatorics, and computational algorithms. Many of those who presented are international leaders in these fields, including special speakers:

- Professor Mireille Bousquet-Mélou of the University of Bordeaux, 2014 winner of the French National Centre for Scientific Research (CNRS) Silver Medal for Mathematics, an expert in enumerative combinatorics, who spoke on combinatorics of lattice walks avoiding a quadrant.
- Professor Jesper Jacobsen of the Ecole Normale Supérieure in Paris, expert on integrable systems in mathematical physics, who spoke on the connection between graph colourings (related to the four colour problem) and their unexpected connection with conformal field theory.
- Professor Christian Krattenthaler of the University of Vienna, expert in combinatorics, who spoke on the unexpected relationship between random walkers with excluded volume constraints (which are a model of polymer phase transitions), and group characters.
- Professor Jean-Marie Maillard, director of research (CNRS), Pierre and Marie Curie University in Paris, an expert in algebraic statistical mechanics who spoke on selected non-holonomic functions in lattice statistical mechanics and enumerative combinatorics.

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- Professor Dr Christoph Richard of the Friedrich-Alexander-Universität Erlanger-Nürnberg, an expert in mathematical physics and non-periodic structures, who spoke on the celebrated diffraction formula for regular model sets (which describe quasi-crystals) and argued it is equivalent to the Poisson summation formula for the underlying lattice.



Two of the special speakers at the meeting, Professor Mireille Bousquet-Mélou (left), and Professor Jean-Marie Maillard (right) (photos: Jesper Jacobsen).

The rich interplay between mathematical physics, pure mathematics and computation was illustrated by many of the talks at the meeting. Professor Jonathan Borwein of *CARMA* at the University of Newcastle, in one of his last conference presentations in Australia before tragically and unexpectedly passing away last year in Canada whilst on sabbatical, spoke about random walks. Professor Borwein's talk demonstrated deep connections with number theory. Professor Murray Batchelor of the ANU spoke about the Heun equation, its relationship to a model for quantum light interacting with matter, and how he first noticed this equation in talks by Tony Guttmann on the enumeration of staircase polygons. Dr Tim Garoni of Monash University spoke of the famous combinatorial 'worm' algorithm, and how the efficiency of this algorithm allows it to be used to calculate critical phenomena.

The range of ages and career stages of the meeting participants represented some of the extensive breadth of Tony Guttmann's collaborations and mentoring relationships. Amongst Tony's former students who were present were Nick Beaton, now of the University of Saskatchewan in Canada, who spoke on models of polymer adsorption, and Yao-ban Chan, recently of the University of Queensland and now back at the University of Melbourne in a lectureship. Many former CIs and postdocs from MASCOS, which Tony founded as the ARC Centre of Excellence for Mathematics and Statistics of Complex Systems over a decade ago, presented. Conference attendees also included PhD students from various Australian institutions, and one undergraduate student. Also present on the wings and even attending some of the talks were the small babies of several of the conference participants.



Public Lecturers Cassandra Portelli (left) and Professor Nalini Joshi (right).
(Photo of Professor Joshi by Ted Sealey.)

An initiative designed to foster the engagement of school teachers and trainee school teachers with the mathematical research community, in the form of a public lecture entitled ‘Journeys Through Mathematics and Life’ closed the conference. This was a joint initiative between the Guttmann Conference, *ANZAMP*, the OLT project *Inspiring Mathematics and Science in Teacher Education (IMSITE)* and ARC Centre of Excellence *ACEMS – Mathematical and Statistical Frontiers*. The speakers at the Public lecture, Professor Nalini Joshi of the University of Sydney and Cassandra Portelli, Head Maths teacher at the Hunter School of the Performing Arts, were chosen for their eminence in their respective work in mathematical physics and mathematics, their ability as communicators, and as exemplars of women living creative, successful and joyful mathematical careers. The lecture was well attended by a mix of conference attendees, mathematics students and pre-service teaching students from the University of Newcastle. The in-lecture activity of making polyhedra out of straws and investigating their projections was particularly embraced by the trainee teachers in attendance.



Some of the *Guttmann 2015: 70 and Counting* participants, from left to right: Eren Metin Elçi, Tim Garoni, Alexandr Garbali, Inna Lukyanenko, Jesper Ipsen, Jens Grimm, Laurence Field, Paul Pearce, Jorgen Rasmussen, Nicholas Beaton, Yao-ban Chan, ?, Christoph Richard, Zeying Chen, Andrea Bedini, Ian Enting, Vladimir Mangazeev, Joshua Hartigan, Aleks Owczarek, Jan De Gier, Tony Guttmann, Jean-Marie Maillard, Richard Brak, Omar Foda, Mireille Bousquet-Mélou, Ole Warnaar, Christian Krattenthaler, Vladimir Bazhanov, Michael Assis, Nathan Clisby, Murray Batchelor (photo: Jesper Jacobsen).

It was fitting that *Guttman 2015: 70 and Counting* should be held in Newcastle, since this was a return to an old home for Tony, who had his first lectureship at the University of Newcastle. Newcastle city beach, overlooked by the conference venue, provided an opportunity for morning and evening swims and runs by conference participants, including Tony who is known for his love of such pursuits.

Biography of Anthony J. Guttman

Anthony John Guttman is a mathematical physicist, mathematician, educator, mentor and leader within the mathematical community. He is a leading expert in his research areas, and his vigorous international collaborations have strengthened the research ties between Australia and many countries in the wider world, especially France and Canada. Tony is an outspoken and eloquent advocate of equity and quality of education systems at all levels. As founder of AMSI and MAS-COS, and mentor of other young leaders, his positive influence on the Australian mathematical community is ever widening.

Tony was born April 8th, 1945, in Melbourne, the only child of Hungarian immigrants László and Anna Guttman. Tony's parents had come to Australia in 1939 to get away the rising militarism that was of particular concern to them given that they were both Jewish, and settled in Melbourne, originally in St Kilda, and then moved to Hawthorn when Tony was about 8 or 9. He remembers a regular suburban childhood. There was one other boy living close by of Tony's age, and after school they would kick a football in the street. When he was 12 or 13 he got a bicycle, and loved the speed and ease with which it gave him access to places like a huge park just out of comfortable walking distance.

Tony was not sporty at all at school, which might be a surprise to those who know him now for his athletic endeavours. The reason was probably that he was significantly the youngest of his class. The age difference arose as a curious result of a case of the mumps at age six, which caused deafness in his left ear. Tony's parents arranged for him to go to Sydney for a course of treatment, where he stayed for six months billeted with a family in Lindfield and attending a local Sydney school. The treatment didn't work, but when he returned to Melbourne the school tested his knowledge and decided that he should skip a class. Tony's only strong memory of Sydney was of the final part of the trip there. The journey was by ship, and as they sailed into Sydney harbour he recalls looking up, as a very small boy, and being convinced that the mast was going to hit the Harbour Bridge.

As a child, Tony was inventive, practical and hands-on. One of his projects was to make a big aviary for his dozen or so budgerigars. Curiosity and a drive to experiment were also features. The house in Hawthorn had many sheds in the backyard, which Tony soon put to use. One was his chemistry lab. Another was his electronics lab, in which he made radios. He remembers an aspect of 'ultimate nerdiness', from the time that the UK's most famous band visited Australia. Tony had just constructed his first oscilloscope, and he was in his shed tuning in to the cheering crowds and music of the Beatles, with pride and interest watching

the curves the sound traced out on his new machine, instead of going to join the cheering crowds in person.

Tony's self-directed research at home was more inspiring to him than his school classes. He went to Camberwell Central School, followed by Wesley college. He remembers an excellent French teacher at Camberwell, and later a brilliant Chemistry teacher at Wesley. It was the Chemistry teacher, Alan Gess, who sparked the interest that inspired the backyard lab.

Social awareness and a sense that his values did not entirely align with those promoted by his school were a feature of Tony's teenage years. This was the late 1950s and early 1960s, and the sense that Wesley College had of itself was as representing an elite culture defined by distant British Empire. Wesley held and promoted those values with the unquestioned authority of tradition, which at the time included the use of the cane. Tony's happiness was muted in this milieu, though he did enjoy his science classes.

At the age of 16 Tony went to Melbourne University. His enrolment was in neither Mathematics nor Science, but rather Electrical Engineering. He enjoyed the freedom and parties of University life, and in what was quite a shock to him came very close to failing first year. He then focused more seriously on his studies, and realised that he was enjoying mathematics and physics more than Engineering. So Tony switched to a Science degree, and made up the missed material by reading books and independently doing prac work in the labs in his spare time, supported in this plan by an academic coordinator of second year, Ken Hines, who believed in him.

Much of Tony's mathematical training was in the context of, and viewed through the lens of, physics. He learned about differential equations and group theory through quantum mechanics. Complex variable theory and integral transforms were accessed through diffraction physics. An Honours in diffraction was followed by a Masters in X-ray dispersion corrections. Tony finished the Masters early and Norm Frankel got him involved in a massive computational project on the university's mainframe computer, to compute properties of Bose–Einstein condensates. His friends would bring him food from Genevieve's Restaurant while he ran programs for 24–48 hours, on machines whose input mechanism were boxes of punched cards.

One University holiday, Tony went to visit a second cousin who lived in Sydney, and through him met a young woman by the name of Susette. Susette was a sporty type (she was the inter-varsity water-ski jump champion in her University days) and a competitive chess player who had been runner-up in the NSW junior championship. Tony had never played chess competitively but liked the game. The two started playing chess by correspondence. One thing led to another, and Susette became his girlfriend.

Tony moved to UNSW to do his PhD, in part because Susette lived in Sydney where she was studying Arts and Social Work. That was 1967, a memorable year for Tony both academically and personally. He participated in a Summer School at ANU with a stellar cast of presenters including C.N. Yang and Freeman Dyson.

Tony has noted that ‘the lectures were mostly at too high a level for me, in my first month of a graduate program, but were inspiring nonetheless’. The comment was made in an interview with the late Peter Hall for the Asia Pacific Mathematics Newsletter (see http://www.asiapacific-mathnews.com/02/0204/0028_0034.pdf) from which some of the source material for this article is adapted. The vividness with which Tony recalled the summer school of 1967 in the interview forty-five years later is indicative of its impact upon Tony. At the end of 1967, Tony married Susette.

1969 saw Tony complete his PhD dissertation, *Numerical Studies in Phase Transitions*, under the joint supervision of Barry Ninham and Colin Thompson. The latter was just a few years older than Tony, and was later to comment upon the effect it has upon one’s expectations when one’s first PhD student is so good. In Tony’s thesis work he met Self Avoiding Walks (SAWs) which were later to become one of his favourite problems, and illustrative of techniques he was to contribute to across a number of areas of mathematics. Tony’s thesis was concerned with extracting asymptotics from power series expansions and at the time SAWs were just one example.

Tony’s collaborations and friendships with international colleagues have been important in his life and professional career. He made several lifelong friendships in his next academic posting, a postdoctoral fellowship at King’s College, London. One such was Stu Whittington. In 1971 Stu was leaving Cambridge for a post-doc in Canada, and called into Kings College, which was a world centre of series analysis and series generation, to meet members of the group. Tony and Stu hit it off quite well, so that when Tony had a visiting position at the University of Waterloo in 1975 and Stu was in Toronto, Tony got in contact with Stu. Stu invited Tony and Susette to visit, Susette got on well with Stu’s wife Ann, Tony and Stu had work things in common, and the friendship between the couples grew from there. Over the years there has been a flow of visits, ideas, students and postdocs between Stu’s group in Canada (where he is Professor in the Chemical Physics Theory Group at Toronto) and Tony’s research group in Australia.

Tony returned to Australia in late 1971 to a job at the newly established University of Newcastle, which had just created Australia’s first (and maybe last) Faculty of Mathematics. Tony took a punt on the new group, and what followed was a wonderful time. Everything seemed possible. The Foundation Dean, Reyn Keats, was keen on hiring the best possible staff, and there were several new appointments each year for several years.

Tony was put in charge of a new postgraduate Diploma in Computer Science at Newcastle. He built this diploma and lectured its foundation courses, though he had never formally studied computer science. Tony has said that he was ‘at least a week and sometimes two weeks ahead of the students’. He wrote a book called *Programming and Algorithms* out of one of the courses he taught. Meanwhile he and Susette had set up house in Merewether, close to a wonderful ocean pool where he used to regularly swim. By his 30s, Tony was Professor at Newcastle. His first PhD student, Albert Nymeyer, had gotten him into running, and he found it a

great way to cope with the pressures when he was made Head of Department still in his early to mid-30s.

A welcome relief from the administration associated with being Dean came in the form of a sabbatical at the University of Melbourne, followed by an appointment to a Readership there in 1987 and Personal Chair in 1988. Colin Thompson had started the statistical mechanics group there, and what followed was the building of a large successful research group. During this time Tony built strong connections with researchers in France. Some connections arose because he had solved a problem of convex polygons and then found that Delest and Viennot had done it previously. Tony wrote to Delest, who suggested that Tony visit Bordeaux as part of a sabbatical he was to take at Oxford (in 1992). Tony did so and at Bordeaux met Mireille Bousquet-Mélou, who had done her PhD with Viennot. Tony and Mireille started working on problems together, she visited him in 1995, he had a sabbatical in Bordeaux in 1996, and the collaboration has been a source of inspiration ever since, in particular in algebraic combinatorics. One result was Tony's editing a special edition of *Annals of Combinatorics* highlighting the connections between statistical mechanics and algebraic combinatorics.

Tony's research has involved and influenced many areas of mathematics and mathematical physics, particularly equilibrium statistical mechanics. These include enumerative and algebraic combinatorics, probability theory, analysis and discrete analogues of analyticity such as discrete holomorphicity, critical phenomena such as phase transitions in magnetic, polymeric and percolation systems, fluid mechanics, numerical analysis, experimental mathematics and computational algorithms. In 2000 Tony was elected fellow of the AustMS, and then over the years also of SIAM, the Australian Academy of Science and the Australian Academy of Technological Sciences and Engineering. Other honours and prizes include the Hannan Medal of the Australian Academy of Science, the Centenary Medal by the Australian Government, the B.H. Neumann Award for Services to Education, and the Lyle Medal of the Australian Academy of Science.

Tony changed the Australian mathematical landscape enduringly and for the better with his founding in 2002 (together with Jan Thomas) of the Australian Mathematical Sciences Institute, via a grant from the Victorian Government. AMSI has since supported Australian research mathematics, built connections that allow us to speak with one voice to government, and advocated tirelessly and effectively for resources to improve Australia's mathematical capacity through outreach and education.

One year later Tony founded the ARC Centre of Excellence MASCOS (Mathematics and Statistics of Complex Systems), the first ARC-funded centre in the Mathematical Sciences since Neil Trudinger's Centre for Mathematical Analysis at ANU two decades prior. MASCOS had nodes and Chief Investigators at Melbourne University, LaTrobe University, the University of New South Wales, the University of Queensland and the Australian National University. Thirteen years later, Tony continues to direct MASCOS. He is also an encourager and supporter of colleagues building other centres of research in the Mathematical Sciences in Australia.

Tony spent his 70th birthday in Bordeaux, celebrating with a good restaurant meal and then four days later by running the Paris Marathon, an event involving 54 000 runners through the narrow cobbled streets of Paris. This birthday activity is typical of Tony, in ways familiar to his friends and collaborators, including in the enjoyment and pride he takes in his family. Susette had arranged, as a surprise, for Tony's two adult children Jacki and Laurence to join them in Paris. As a further surprise, at the starting line of the race, Laurence took off his jumper to reveal a Paris Marathon race number attached. Tony and Laurence (usually a cyclist rather than a runner), ran the 42.2km race together, finishing in 4:05:35. To Tony's satisfaction his finish was 11th out of 102 in his age group, and according to the WAVA website, equivalent to an age adjusted time for a youngster of 3:00:35.

Tony takes pleasure not only in his own achievements, but also in those of others around him. He appreciates quality wherever he finds it, and takes pleasure in elegant engineering solutions, whether those be the bicycle he was given as a young teenager, or the bone conduction microphone that now allows him to listen to Bob Dylan via bluetooth whilst running, and still safely hear ambient noise. Tony continues to contribute with energy to mathematics, education, colleagues and friends, swimming, running, cycling, and his family including children and grandchildren.

Citation

Some content in this article is based on reporting in the Australian Mathematical Sciences Institute's Research Report 2015–16 as published November 2016: http://amsi.org.au/publications_category/publications/research-reports/.

Animal, Vegetal, Mineral
Cave House Hotel, Yallingup, Western Australia
19–23 September 2016

Gerd Schroeder-Turk*

Event Details

The conference ‘Animal, Vegetal, Mineral’, selected by the Australian Academy of Sciences as the 2016 Boden Research Conference, was designed to encourage open and broad discussions between biologists, physicists, mathematicians, chemists and materials scientists. The idea was to explore the divide between the biological and the natural sciences, and draw out both the common features of living and dead systems and their essential differences.

The conference was jointly organised by Dr Gerd Schroeder-Turk (Murdoch University), Professor Stephen Hyde (ANU), Dr Bodo Wilts (Fribourg University Switzerland), Dr Myfanwy Evans (Technical University Berlin) and Dr Charlotte Conn (RMIT University).

A key focus was structure and pattern formation in biological and synthetic systems, on the nanoscale, and the role of structure and geometry for physical properties and evolutionary function. While such nanoscale geometries are found ubiquitously both in biological systems and synthetic self-assembly, it is becoming increasingly clear that fundamental differences in the formation mechanisms of the biotic and abiotic systems exist. Our understanding of these formation processes hinges on geometric concepts — from differential and hyperbolic geometry to computational and stochastic geometry, hence the importance of engaging the Australian Applied Maths community in this interdisciplinary event.

‘Animal, Vegetal, Mineral’ was a bold and successful attempt to encourage nearly 80 scientists from Australia, Europe, Asia and the Americas to think more fundamentally about their connections to the broader community of scientists, and look in detail ‘over the fence’ that usually divides life from natural scientists and mathematicians from lab- and field-based researchers. With 11 keynote lectures by some of the leading scientists of their fields, 10 invited talks, 27 contributed talks and 23 poster presentations, ‘Animal, Vegetal, Mineral’ was a major event within the Australian and West Australian science year 2016.

Report

The significance of the conference is well summarized by a quote by Professor Justin Marshall, ARC Laureate Fellow, University of Queensland:

... a superb and stimulating conference. The ‘cross-cultural’ aspect of getting biologists, physicists, mathematicians, chemists and engineers

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together made it particularly powerful in finding ways forward. It showed the power of mixing it up—something we should do more.

This quote demonstrates that the conference achieved its stated goal to create a profound inter-disciplinary discussion forum, enabling genuine interaction between communities that are otherwise disjoint despite addressing related subject areas. The conference achieved this goal at a very high level, given the cross-section of participants:

- 76 participants
- 2 Fellows of the Royal Society
- 2 Fellows of the Australian Academy of Sciences
- 50 international participants (11 Americas, 11 UK, 3 Singapore, 3 Japan, 2 China, 1 Russia, 19 continental Europe)
- interdisciplinary audience (approximately 10% biochemistry, 12% biology, 12% chemistry, 10% materials science, 13% maths, 16% physics, 17% theoretical physics, and others)
- 26 professors

Immediate and tangible outcomes of the meeting:

- A forthcoming issue of the Royal Society Journal *Interface Focus* dedicated to the meeting, with approximately 12–17 research articles by conference attendees
- Several collaborations between conference participants
- Proposals and inspiration to hold follow-up meetings with similar scope and philosophy in the near future at the Kavli Institute at the University of Santa Barbara (Professor Mohan Srinivasarao), in continental Europe (Professor Angelina Angelova) or at the International Centre for Mathematical Sciences in the UK (Dr Adil Mughal)

Of equal importance is the contribution that this meeting has made to creating bridges between disjoint research communities, leading to synergies for future research directions. We feel that this meeting has achieved this goal, providing an important roundtable discussion forum for nanostructure formation in biology and chemistry and emphasizing the essential role that geometric mathematical approaches and modelling play in this field.

Topics covered

- Pattern and structure formation in biology and synthetic self-assembly
- Relationships between geometry and function/properties
- Geometric methods and concepts for applied and life sciences
- Nanostructures and biomimetic approaches
- Geometry, including hyperbolic, computational and stochastic geometry
- Protein and lipid assemblies in natural and synthetic membrane systems

Special presenters

- Professor Richard Prum, Yale University, USA: ‘Optical Evo-Devo: Self-Assembly and Evolution of Bio-Optical Nanostructures’

- Professor Poul Erik Jensen, University of Copenhagen, Denmark: ‘Plant chloroplasts development — cubic membrane structures and their components’
- Professor Konrad Polthier, Free University Berlin, Germany: ‘Covering and Uncovering Surfaces’
- Professor Neil Hunter FRS, University of Sheffield, UK: ‘Biogenesis, structure and function of photosynthetic membrane proteins’
- Professor John Seddon, Imperial College London, UK: ‘Bicontinuous and Discontinuous Lipid Cubic Phases’
- Professor Peter Vukusic, University of Exeter, UK: ‘New twists in circular polarisation reflection from scarab beetles’
- Professor Mohan Srinivasarao, Georgia Tech, Atlanta, USA: ‘Spontaneous emergence of Chirality and self-assembly’
- Professor George Attard, University of Southampton, UK: ‘When does the inanimate become animate? (and does it matter?)’
- Professor Justin Marshall, University of Queensland, Australia: ‘Stomatopod crustaceans: optical data storage, cancer detection and satellite design through nature’s nanostructures’
- Professor Leslie Dutton, University of Pennsylvania, USA: ‘Toward biogenesis of first-principle design and construction of light and redox proteins working in cells’
- Professor Yuru Deng, Changzhou University, China: ‘Living crystals: biological cubic membranes’

Program Outreach

The event was followed by a week-long research school conducted at Murdoch University, and attended by approximately 15 students and researchers. With a similar theme to the conference, yet more space and time for didactic presentation of the material, this school further contributed to spreading the important interdisciplinary concepts developed at the conference to a broader audience of younger students.



Obituaries

Wendy Robertson

1927–2016



Wendy Robertson was a renowned mathematician, an inspiring teacher, and a highly respected colleague. Her book on topological vector spaces, published with her husband Alex Robertson in 1966, continues to be cited to this day. She came to Perth in 1973 with Alex who had been appointed to the inaugural Chair of Mathematics at Murdoch University. Wendy held a senior lectureship in mathematics at the University of Western Australia from 1973 until her retirement in 1989.

Wendy Robertson was born in 1927 in Wembley Park, which was then on the outskirts of London, and her only sibling, a brother Stanley, was born three years later. Her father, David Sadie, was a silk merchant. Her mother, Deborah Sadie (née Simons), who was a middle child in a family of 12, left school at the age of 14 to work as a secretary, and help support her family; she bobbed her hair and participated in the suffragette movement of the 1920s in London. Wendy was very close to her father who built her a large and wonderful dolls' house modelled on their own house, which became one of her most treasured possessions. Her childhood was a happy one despite her family home being bombed during World War II. Wendy won a scholarship to St Paul's Girls' School, and then, in 1946, she won a 'Major Scholarship' to Girton College, Cambridge, becoming one of the small number of women admitted to read mathematics there. She completed Part II as

wrangler in 1948, and then Part III with distinction, gaining her BA in 1949. She then commenced research in functional analysis under the supervision of Frank Smithies, and supported by an M. T. Meyer Research Studentship (1949–51). Bertha Swirles (Lady Jeffreys), who held an Official Fellowship and was Director of Studies in Mathematics at Girton College from 1949–69, described Wendy as the best student she had ever taught (in conversation with Cheryl and Ruth Williams over tea at Girton College in the 1990s).

During her time in Cambridge, Wendy met Alexander Provan Robertson, and they married in 1951. Wendy continued working on her doctoral research after she and Alex moved to Glasgow, and while she taught mathematics at Glasgow University. Her first child Lorna was born in 1953 interrupting her teaching career. Her research continued with the award of an M. T. Meyer Research Bye-Fellowship at Girton (1954–55), and by the time she completed her PhD in 1955 she was pregnant with her son Philip.

By 1957 her third child Clare had arrived. When Clare was of kindergarten age, Wendy returned to teaching at the University of Glasgow until her fourth child Rachel was born in 1963. She continued to give courses each year in the Extramural Department at Glasgow through to 1965, when the family moved to Keele just prior to the birth of her fifth child Vivienne. Whilst there she gave courses through the Department of Adult Education. She managed a fairly steady stream of mathematical work at home, including PhD examining, refereeing for journals, reading manuscripts for publishers, and book reviews. She regularly attended seminars both in Glasgow and Keele, and she also maintained an active research life, publishing several journal articles and an immensely influential book. After spending six months in Perth in 1969 on visiting appointments at the University of Western Australia, Alex and Wendy decided to move permanently to Western Australia in 1973: Alex as inaugural Chair of Mathematics at Murdoch University and Wendy to take up a Senior Lectureship at UWA. Alex and Wendy actively encouraged interactions between the mathematicians at Murdoch University and their colleagues at the University of Western Australia, promoting joint research seminars and hosting many social events (as outlined further in the obituary for Alex at www.austms.org.au/Gazette/1995/Oct95/robertson.html). Wendy was a dedicated, committed, and inspiring teacher, a mentor to younger staff and a diplomatic administrator.

Wendy's first paper (co-authored with Alex) 'On the closed graph theorem' was published in 1956 and their co-authored book, *Topological Vector Spaces*, was published by Cambridge University Press in 1964, reprinted in 1966, and then in a second edition in 1973. The book, and its translations into German and Russian, has been widely used as an advanced text for graduate students.

Wendy's research reverberates in the current work of Stephen Saxon, whose 'Baire-like spaces' (1972) cited Wendy's first paper. Her last three papers, from 1988 and 1989, are cited in five articles written since 2014 by Stephen and coauthors, the latest dedicated to her memory. Jointly with Luis Sánchez Ruiz, Stephen solved the countable enlargement (CE) problems for separable weak barrelledness in 'Reinventing weak barrelledness' (2017). Ian Tweddle and Wendy, his mentor,

were principal exponents of CEs. Their barrelled CE problem remains open: if (E, τ) is a barrelled space with continuous dual $(E, \tau)' \neq E^*$, must there be a finer barrelled topology \mathcal{T} on E such that $(E, \tau)'$ is \aleph_0 -codimensional in $(E, \mathcal{T})'$?

Wendy and Stephen gave a positive answer when (E, τ) is separable in one of her last papers ‘Dense barrelled subspaces of uncountable codimension’ (1989). Her previous paper ‘Barrelled spaces and dense vector subspaces’ (1988), with Alex and Stephen, invented and applied an attractive splitting theorem subsequently used/refined by Stephen, Ian, and others.

Research on these two papers began when the Robertsons visited Stephen for some weeks at the University of Florida, a collaboration abbreviated by Wendy’s retirement in 1989. Her final journal article ‘On properly separable quotients of strict (LF) spaces’ (1989) introduced properly separable quotients. Stephen combined them with weak barrelledness (*J. Math. Anal. Appl.*, 2016) to solve her paper’s primary question. Wendy’s thoughtful, gracious, modest reply to Stephen (email, September 2015) mentioned her grandchildren, his singing, and not a word of her growing mathematical legacy.

Wendy and her husband Alex greatly loved travelling. This reflected Wendy’s thirst for knowledge, a cosmopolitan view, and a curiosity and interest in the natural world. Often she and Alex travelled to mathematics conferences or to take up visiting teaching or research appointments, for example, in Kansas, Berkeley, Seattle, and Philadelphia. They participated in six of the quadrennial International Congresses of Mathematicians, the four between 1954 and 1966, and the Helsinki ICM in 1978 and Berkeley ICM in 1986 as part of sabbatical leaves from Australia. In 1969, Wendy took four of the children to India, Nepal, Thailand, Singapore and Hong Kong on the way to the visiting appointment in Perth, with Alex and Lorna following after finishing the term in the UK. In 1973, when the Robertson family emigrated to Australia, Wendy and the three youngest girls (aged 7, 9 and 15) came in advance of Alex and the older children via Greece, Iran and Sri Lanka.

Wendy had an abiding love of classical music. There was always music in the Robertson household. Wendy played the piano and clarinet, and Alex the piano and organ. The family sang in the car on their road trips. Wendy’s parents had met through Gilbert and Sullivan operas and her brother, Stanley, became a renowned musicologist. After her retirement Wendy was deeply engaged with music, attending concerts around the world and singing in several choirs.

Sadly, her husband Alex died in early 1995. His death devastated Wendy, but with typical courage and grit, she made herself get out, did voluntary work at the UWA Music Library and elsewhere, and babysat her grandchildren. In 2000, she had a small villa built in Nedlands to her own specifications. She always spent many hours in her gardens, and in her final home she created verges of native flowers and bushes. Although in her 40s when she came to live in Australia, she adopted the landscape and flora of Australia very quickly, always using native plants and learning all their Latin names. She read widely, mainly contemporary fiction, and was fascinated by politics, a member of Greenpeace and a supporter of social justice causes. Earlier in 2016, she was even sending stern emails to the Prime Minister suggesting a more compassionate approach to refugees. In the words of

her children, Wendy “was a remarkable woman of many talents”. For example, she loved cricket, was captain of her school’s cricket team and played for the Middlesex Women’s County Cricket Team. She was a leg-spin bowler and used to say that she was never the best batsman but always the most difficult to get out. Indeed, she was never predictable, always surprising, always independent, and with an indomitable will. She decided she wanted a sports car for her 50th birthday and, thanks to her son Philip, she got a red Sunbeam Alpine. Later, she drove an MGB in British Racing Green.

Wendy was immensely proud of her children, their partners and her grandchildren, and their achievements, personalities and passions. She had a phenomenal memory, especially for numbers and dates, and an eye for detail that few could match. She thoughtfully left some factual information for her children that she thought they would need for her funeral. At the end of the note she wrote: “Most important to me was our family life. Thank you all for everything you and your families have given to me.” We thank all of Wendy’s children for their invaluable assistance to us in the writing of this tribute.

We thank Wendy for her contributions to mathematics in Australia, her rigorous and inspirational teaching, and her loyalty and generosity as a colleague.

Vale Wendy.

Cheryl E. Praeger and Stephen A. Saxon

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Obituaries

Anne Penfold Street AM

11 October 1932 to 28 December 2016



With the passing of Anne Penfold Street on Wednesday 28 December 2016, the international combinatorial community has lost a dear friend and a respected colleague. Anne is survived by her daughter Deborah Street, son Anthony Street and her grandchildren Amelia Street and Thomas Wilson.

Born in Melbourne, Anne studied at the University of Melbourne. She graduated with a Master of Science by research in Chemistry in 1956. This study sparked Anne's interest in the mathematics needed for the application of quantum mechanics to the prediction of properties of new compounds and she went on to complete a PhD in group theory under the supervision of Michio Suzuki at the University of Illinois in 1966.

In 1967 Anne took up a lectureship in Mathematics at The University of Queensland and moved through the ranks, being appointed to a personal chair in Mathematics in 1985. In 1990 the Centre for Combinatorics was established with Anne as its director. In 1993 Combinatorics was designated a University Priority Area at The University of Queensland, and in 1998 a merger with the Algorithm Design Group resulted in the formation of the Centre for Discrete Mathematics

and Computing with Anne as its Director from its inception until she stood down in 2004.

Although initially Anne's research was in group theory, Anne's main research interest was in combinatorial designs, binary arrays and Ramsey theory. As Anne described it, "Each of these topics explores distinct properties of families of subsets of finite sets: a design is a way of choosing a family of subsets with certain specified properties; binary arrays can be considered as lists of subsets of a finite set; Ramsey theory deals with properties which certain families of subsets must inevitably have." While the relevance of this area of mathematics to designed experiments was realised in the 1930s Anne made a significant contribution to the discussion through numerous publications including coauthoring a seminal text *Combinatorics of Experimental Design* with her daughter Deborah. With the advent of the computer, applications have extended to include the encoding of information for its storage and use in a computer, and in the secure transmission of digital information.

Much of Anne's research was supported by Australian Research Council grants. With this funding Anne developed an internationally renowned researcher network at the University of Queensland, providing financial support for young postdoctoral researchers and building a strong research environment for the mentoring of her colleagues. She supervised eight PhD students and three MSc by research students. Former student Catherine Greenhill said, "Anne gave me my start in research, and was a wonderful role model" and another student, Edward Dawson, said, "Anne supervised my MSc thesis and very much helped direct me 35 years ago into a research career".

Anne was honoured by the award of one of the inaugural Australian Senior Research Fellows (1991–1995), and of a D. Math (*honoris causa*) by the University of Waterloo in 1996.

Anne was active from the beginning in the conference series now known as the Australasian Conference on Combinatorial Mathematics and Combinatorial Computing (ACCMCC). Started informally, the participants eventually formed the Combinatorial Mathematics Society of Australia (CMSA) which incorporated in 1996 with Anne as the president. She received the inaugural CMSA medal for outstanding service in 1999 and at the most recent conference in the series (2016) the student prize given at each conference was renamed as the CMSA Anne Penfold Street Student Prize. To further promote this organisation and associated research activities Anne oversaw the establishment of the *Australasian Journal of Combinatorics* and was Editor-in-Chief from 1990 to 2001.

In 1990 the leading international body in the area of combinatorics, the Institute of Combinatorics and its Applications, was set up. Anne was a Founding Fellow and was on its Council from its inception until the end of her terms as president (1996 to 2002).

Anne took an active role in the development of a teaching program in combinatorics and co-authored five textbooks which became standard texts in the area, in Australia and overseas.

Anne dedicated much of her professional and personal time to the activities of the Australian Mathematics Trust (AMT), working to challenge and to encourage the development of young Australians' understanding of mathematics and informatics and to help them to realise their intellectual potential in these areas. The importance of Anne's contribution was acknowledged when she was awarded the 1994 Bernhard H Neumann Award for excellence in mathematics enrichment.

Her work with the AMT and as President of the Australian Mathematical Olympiad Committee, together with her mentoring of junior colleagues resulted in her being appointed a member of the Order of Australia in 2014 for services to education in mathematics.

Through passion and dedication Anne significantly enhanced Australia's international reputation and advanced mathematical proficiency. Her contribution to academia has left a substantial legacy for Australia. I personally remember Anne for her strength and the cool, calm approach that she displayed no matter what the situation. Anne has inspired many of us to strive for excellence and achieve our full potential.

Anne will be very sadly missed by her many friends both in Australia and around the world.

Diane Donovan

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Technical Papers

A Poincaré duality in K -theory

Hao Guo*

Poincaré duality is a fundamental result that relates the homology and cohomology groups of manifolds. For M a compact orientable manifold of dimension n , it states that we have an isomorphism

$$H_k(M) \cong H^{n-k}(M)$$

for each $k \in \{0, \dots, n\}$, where we may take, for example, coefficients in \mathbb{Z} . If we take instead coefficients in \mathbb{R} , Poincaré duality implies that, in order to determine the de Rham cohomology of an oriented compact manifold, it suffices to calculate only the first $\lceil \frac{n}{2} \rceil$ groups. The isomorphism can be realised via the cap product, a bilinear map

$$\cap: H^q(M) \times H_p(M) \rightarrow H_{p-q}(M), \quad p \geq q,$$

in the following way. Orientability of a compact manifold means that there exists an element $[M] \in H_n(M)$, called the fundamental class, with the property that when the second argument above is restricted to $[M]$, \cap gives an isomorphism of abelian groups. That is, we have

$$\cap: H^q(M) \times [M] \xrightarrow{\sim} H_{n-q}(M).$$

A simple example of a compact non-orientable manifold where Poincaré duality fails to hold (over \mathbb{Z}) is the Klein bottle K^2 , whose homology groups are $H_0(K^2) = \mathbb{Z}$, $H_1(K^2) = \mathbb{Z} \oplus \mathbb{Z}_2$, and $H_2(K^2) = 0$.

In the setting of complex K -theory, an extraordinary cohomology theory, a version of Poincaré duality also holds for manifolds that satisfy an analogous notion of orientability. Here, the cohomology groups $H^k(M)$ are replaced by the complex topological K -theory groups $K^i(M)$, with $i \in \{0, 1\}$, while the homology groups $H_k(M)$ are replaced by the K -homology groups $K_i(M)$. The notion corresponding to that of an orientable manifold is that of a so-called Spin^c manifold.

The group $K^0(M)$ is constructed using complex vector bundles, subject to an equivalence relation defined by stable isomorphism. The group $K_0(M)$ is constructed from certain abstract elliptic operators acting on sections of complex vector bundles over M , subject to a certain equivalence relation [3]. Recall that ellipticity of an operator is defined by invertibility of its symbol; a familiar example of an elliptic operator is the Laplacian on \mathbb{R}^n , $\Delta = \frac{\partial^2}{\partial x_1^2} + \dots + \frac{\partial^2}{\partial x_n^2}$.

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Hao Guo was awarded the B.H. Neumann Prize for best student presentation at the annual meeting of the AustMS in 2016. This extended abstract is an invited contribution to the *Gazette*.

H.G. is supported by a University of Adelaide Divisional Scholarship.

There is also a K -theoretic analogue of the cap product,

$$\cap: K^q(M) \times K_p(M) \rightarrow K_{p-q}(M),$$

where the index $p - q$ is taken mod 2. The notion of Spin^c is strictly stronger than that of orientability, as we explain now. Note that one way to characterise orientability is to say that the restriction of the tangent bundle TM over any embedded loop $S^1 \hookrightarrow M$ is trivialisable. A manifold M of even dimension greater than or equal to 4 is said to be Spin^c if it is orientable and the restriction of TM over any embedded 3-sphere $S^3 \hookrightarrow M$ has a complex structure.

A Spin^c -structure on a manifold makes it possible to construct an operator that plays an analogous role to that of the fundamental class in homology, called the Spin^c -Dirac operator, D . Suppose, for simplicity, that M is an even-dimensional compact Spin^c -manifold. Then the elliptic operator D defines a class $[D] \in K_0(M)$. $[D]$ plays the role of $[M]$ in the sense that restriction on the second factor of \cap produces the following isomorphism of abelian groups:

$$\begin{aligned} \cap: K^0(M) \times [D] &\xrightarrow{\simeq} K_0(M), \\ [E] \cap [D] &\mapsto [D_E]. \end{aligned}$$

Here E denotes a complex vector bundle over M and D_E the Spin^c -Dirac operator on M twisted by E . This is the analogue of Poincaré duality in the setting of K -theory when the manifold M is Spin^c .

In joint work with my supervisors Professor Mathai Varghese and Dr Hang Wang [1], we establish a Poincaré duality for the equivariant version of K -theory — that is, where one takes into consideration the action of a Lie group G on a (possibly non-compact) manifold X and compatible actions of G on complex vector bundles over it. For a fixed compact Lie group G , the topological K -theory group is replaced by a group $K_G^0(X)$, defined using G -equivariant vector bundles; an account of this theory can be found in [6]. The equivariant theory of K -homology, denoted $K_0^G(X)$ (where G may be non-compact), can be found in [3]. Elements in this group are represented by abstract G -invariant elliptic operators on the manifold subject to a certain equivalence relation.

The setting of our result is as follows. Suppose G is a Lie group with finitely many connected components, acting properly on a smooth even-dimensional manifold X (not necessarily compact) with a G -equivariant Spin^c -structure, and that the orbit space is compact. The action is said to be proper if the inverse image of any compact set under the map

$$\begin{aligned} \mu: G \times X &\rightarrow X \times X, \\ (g, x) &\mapsto (x, g \cdot x) \end{aligned}$$

is compact. For example, the action of a compact Lie group on any manifold is necessarily proper. On the other hand, the action of \mathbb{Z} on S^1 by irrational rotations is not proper, although it is free.

Under these assumptions, we establish the following equivariant version of Poincaré duality:

$$\begin{aligned} K_G^0(X) &\cong K_0^G(X), \\ [E] &\mapsto [D] \cap [E] := [D_E], \end{aligned}$$

where E is a G -equivariant complex vector bundle, D is the G -invariant Spin^c -Dirac operator on X , and D_E a twisted operator. This map is entirely similar to that in the non-equivariant version of Poincaré duality. Now when the Lie group G is non-compact, the elements of $K_G^0(X)$ cannot always be represented by finite-dimensional G -equivariant vector bundles [4]. However, it can be shown that when G has only finitely many connected components, finite-dimensional vector bundles are enough [5], so that the above isomorphism makes sense.

The Poincaré duality in [1] is the first such result in equivariant K -theory for non-compact groups acting on non-compact manifolds. It generalises a previous result of Kasparov [2], which covers the case of compact G and compact X , to a much larger class of Lie groups. The requirement that X be even-dimensional, which we invoked above in order to simplify notation, can be removed without much difficulty. In addition, in the same paper [1], we establish a more general Poincaré duality where the assumption that M be Spin^c is dropped.

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Left to right: Sean Carnaffan (Honourable mention; University of Sydney); Scott Lindstrom (Honourable mention; University of Newcastle); Dr Katherine Seaton (La Trobe University); Anthony Carapetis (Honourable mention; ANU); Trang Thi Thien Nguyen (Honourable mention; University of South Australia); Winner of the BH Neumann prize: Hao Guo (The University of Adelaide); Professor Kate Smith-Miles (Monash University)

Book Reviews

Why is there Philosophy of Mathematics at all?

Ian Hacking

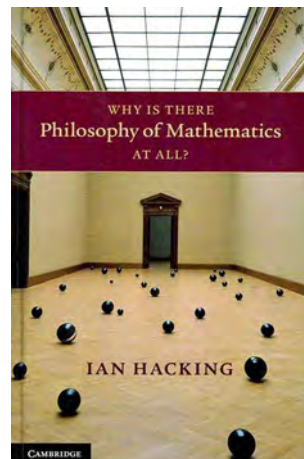
Cambridge University Press, 2014, ISBN 978-1-107-05017-4 hardback

Also available in paperback, ISBN 978-1-107-65815-8

Ian Hacking is a retired Professor of Philosophy of the Collège de France and the University of Toronto, specialising in the philosophy of science. He is also the author of popular books on logic and the history of probability.

His book is ostensibly addressed to his fellow philosophers, but because of its lively style and provocative title, it is likely to appeal to educated lay readers and especially to mathematicians. Hacking's argument is that mathematics has a special rôle in philosophy because it exemplifies the fundamental philosophical concepts of existence (ontology) and knowledge (epistemology) as well as logic.

For example, Pascal, Descartes and Leibniz are equally renowned as philosophers and mathematicians; many philosophers such as Bacon, Berkeley, Kant, Frege, Bernays, Lakatos, Kuhn, Pierce, Quine, Russell and Wittgenstein continually referred to mathematics; and mathematicians like Cantor, Dedekind, Gödel, Hamilton, Hardy, Hilbert, Kronecker, Littlewood, Weyl and Weil contributed to philosophical discourse. Hacking also describes recent forays by Atiyah, Connes, Gowers, Grothendieck, Selberg, Thurston, and Voevodsky into philosophical argument. While Hacking's work is strong on the Western historical background, he ignores contributions of the medieval Islamic philosophers.



What precisely is the philosophical argument, and how does it impact on mathematics? The two major opposing schools in analytic philosophy today are *realism* and *nominalism*. Hacking's amusing example discusses the two statements: 'Jupiter has 67 moons' and '67 is the number of moons of Jupiter'. They seem to assert equivalent propositions but they mean different things to realists and nominalists.

As far as mathematics is concerned, realism, which includes platonism and intuitionism, asserts that mathematical objects and structures exist and the mathematician's job is to discover them, whereas nominalism, associated with constructivism and formalism, asserts that mathematics is invented by human minds deducing conclusions by explicit rules from more or less arbitrary hypotheses. But whereas philosophers are usually in one or the other camp and boldly declare their allegiance, mathematicians are more circumspect and willingly switch when they deem it appropriate. For example, who could deny that Group Theory is invented,

but the sporadic simple groups discovered? On the other hand, the independence of the continuum hypothesis seems to put paid to outright platonism. Hacking himself fairly and forcefully presents both sides of the mathematical argument but does not embrace a single alternative.

One of the major themes of the book is proof. How did it arise in mathematics, how has it changed through history, and where is it headed? A novel viewpoint is Hacking's classification of mathematical proof as either Leibnizian or Cartesian. The first denotes a proof which consists of a finite sequence of statements each of which is an axiom or follows from previous statements in the list by *modus ponens* or some other rule of inference. This definition can be modified to allow recursively defined infinite natural deduction trees. On the other hand, a Cartesian proof is one which you can and must grasp as a whole. Examples, other than those in Descartes' *Meditations*, include Plato's proof of Meno's slave that you double the area of a square by constructing the square on the diagonal, and Littlewood's proof that while a square can be dissected into smaller squares each of a different size, a cube cannot be dissected into smaller cubes each of a different size.

Incidentally, this is one part of the book where I disagree with Hacking. He claims that proof began with Thales and is unique to Western mathematics. This may be true if you limit yourself to Leibnizian proof, but many examples of Cartesian proof can be found in Arabic, Chinese and especially Indian mathematics.

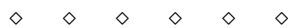
Another recurrent theme in the book is the relation between pure and applied mathematics. Hacking points out that well before any distinction was made between them, there was 'mixed' mathematics, even by that name, in Francis Bacon's work. It meant simply that one can apply Euclidean geometry to ballistics or mechanics, for example, by adjoining an empirical component. The same concept occurs in Galileo's work on sliding and freely falling bodies. Other applications discussed include Newtonian physics, probability, the 19th century division of mathematics into pure and applied and its effect on mathematical education, and the philosophical implications of the continuing division.

Hacking has read broadly in areas of current mathematical interest, such as the Langlands program and univalent foundations, but admits his ignorance of the details. Therefore it would be unfair to dwell on the mathematical errors in this book, such as his belief that there are 26 finite simple groups.

His message is that mathematics is of continuing interest and importance to analytic philosophy. Whether philosophy has anything to offer mathematics is a matter of opinion. Many noted mathematicians believe it has; my personal view is that it is a waste of time to worry about whether 67 or even the set of whole numbers exist, but it is worthwhile occasionally to step back from the coalface and consider the meaning and importance of our work.

Phill Schultz

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AAG News

Brian Davey*

Report from the Australian (née Victorian) Algebra Group

A brief history of the Australian Algebra Group

A history of the Australian Algebra Group is necessarily brief. It came into existence in December 2016 when the Council of the AustMS agreed that the Victorian Algebra Group could change its name to the Australian Algebra Group (AAG). The main task of the AAG will be to organise the annual Australian Algebra Conference, which will replace the annual Victorian Algebra Conference. The name changes reflect the fact that the annual conference has established itself at the national level. The group is funded according to the Society's funding rules for special interest groups, where financial support is via membership and a subvention based on the number of AAG members. AustMS members may elect to join the AAG when they renew their AustMS membership.

The first Australian Algebra Conference will be held at the end of 2017 — the venue and precise dates will be announced on the AAG website: <http://austalg.ltumathstats.com>.

A brief history of the Victorian Algebra Group

The first *Algebra Conference of Victoria* was held in 1983 at The University of Melbourne. It has been run every year since with broad participation from across Australia—typically 25% of participants have been from interstate or overseas.

The conference grew out of a two-day workshop on universal algebra and lattice theory held at La Trobe University in 1982. The success of the workshop led Gordon Preston to suggest that we should do something similar every year, and so the series of annual conferences began. Initially, the venue for the conference rotated through La Trobe, Melbourne and Monash universities, with the host university absorbing costs.

In 1987, RMIT joined the mix and hosted the 1988 conference. At Gordon Preston's suggestion, Kathy Horadam made a submission to the AustMS for formal status as a Special Interest Group. This was approved and in May 1988 the *Victorian Algebra Group* (VAG) came into existence—the first Special Interest Group of the AustMS. The principal activity of the VAG was to run the annual algebra conference, whose name morphed in 1992 into the *Victorian Algebra Conference* (VAC).

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The VAC has a proud tradition of encouraging student talks. Many Australian graduate and honours students in algebra gave their first conference talk at the VAC. Typically between 25% and 40% of participants have been students and 30% of the talks have been given by students.

In 2006, the VAG created a prize for the best student talk at the VAC. To acknowledge his important role in the formation of the group and the annual conference, the prize was named the *Gordon Preston Prize*. So far the prize winners have come from the University of Melbourne (5), the University of Sydney (3), La Trobe University (2) and Monash University (2).

Go to <http://austalg.ltumathstats.com> for more information about the group, the conference and the prize.

Report on the 34th Victorian Algebra Conference

The 34th Victorian Algebra Conference was held at the City Campus of La Trobe University on 22–23 November, 2016. It was organised by Marcel Jackson and Brian Davey and was supported financially by the AustMS, via the VAG, and by La Trobe University's *Discipline Research Program in Mathematical and Computing Sciences*.

There were 35 participants: 25 from Victoria, 5 from New South Wales and 3 from Tasmania. Of the 17 talks, five were given by students. The two plenary talks were given by Murray Elder and Kathy Horadam.

The winner of the Gordon Preston Prize for the best student talk was Jon Xu (University of Melbourne) for his talk 'The thickness of Schubert cells'. Jon also received the prize in 2012.

This 34th iteration of the VAC was of special significance, as it was the final conference to be held under the title 'Victorian Algebra Conference'.

After having served as chair for 13 years, this is my final VAG report. Lawrence Reeves of the University of Melbourne has been elected as the first chair of the Australian Algebra Group.



Brian Davey is an emeritus professor at La Trobe University. His research specialty is universal algebra with an emphasis on the theory of natural dualities and applications of Priestley duality to algebras arising in algebraic logic. His text *Introduction to Lattices and Order*, co-authored with Hilary Priestley, has sold over 10,000 copies and has over 5300 Google-Scholar citations. He is Co-editor in Chief of *Algebra Universalis*, an Associate Editor of the *Bulletin of the AustMS*, and was an Associate Editor of the *Journal of the AustMS* from 1994 to 2004. He was an AustMS Council member from 2004 to 2006. He was chair of the Victorian Algebra Group from 2004 to 2016. Brian is a coffee enthusiast and in his spare time he plays the ukulele.



AMSI News

Geoff Prince*

AMSI Optimise announced

MAXIMA at Monash University, 26–30 June 2017

We are very pleased that the first AMSI Optimise event will take place at Monash University in the week of 26 June 2017. Hosted by the University's MAXIMA research platform and directed by Professor Andreas Ernst, AMSI Optimise comprises a three-day research/industry symposium followed by a two-day research workshop. AMSI Optimise joins our other flagship programs co-funded by the Commonwealth. The principal theme of the three-day symposium is logistics, you can see the full program at <http://optimise.amsi.org.au>.

AMSI Winter School 2017: Computational Foundations of Data Science

QUT, 26 June to 7 July 2017

This will be QUT's first Winter School (but we all know there is no winter in Brisbane). Professor Ian Turner (QUT) is the School's Director and Professor Hans de Sterck (Monash) is the Scientific Director. As usual the School is built around a major and current topic, offering considerable benefit to PhD students and ECRs. Under the broad heading of computational foundations of data science the sub-themes are: Inverse Problems, Numerical Linear Algebra, Bayesian Inference and Data Assimilation, Machine Learning, Model Reduction Methods and Nonlinear Optimisation. You can see further details at <http://ws.amsi.org.au>.

NCRIS passes the buck!

In the last AMSI News I complained about the maths vacuum in the NCRIS (National Collaborative Research Infrastructure) Discussion Paper. Well, in the Draft Roadmap <https://docs.education.gov.au/node/42216> maths does finally rate a mention (on page 17):

As the complexity of the research methods and technologies to undertake ground breaking research grows, advanced mathematics continues to be an important and scarce resource. Maximising the development of algorithms and predictive modelling scenarios, integral to many areas of research, can only be realised with strong mathematical capabilities.

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However,

While national research infrastructure facilities can provide an enabling and facilitation role, there are limits to the extent that the skills gaps can be addressed by facilities.

And the buck is thereby passed to the universities who are meant to supply this scarce resource by implementing the recommendations of the ACOLA Review of Research Training. You can read AMSI's critique of this lack of leadership at <https://submissions.education.gov.au/forms/2016-strategic-roadmap/pages/index>.

AMSI Research Report 2015–2016

Our latest annual Research Report was released at the end of last year covering our workshop program, flagship research training events, internships, ACE program and lecture tours. It contains reports of all our workshops including some features, an interview with Terry Tao, a piece on female participation in research and profiles of interns and vacation scholars. It has been produced in AMSI's usual accessible and classy style and you can find it online at <http://amsi.org.au/publications/research-reports-2015-16/> and in departmental common rooms around the country.

AMSI Intern expansion

At the time of writing (1 February) a draft contract from the Commonwealth is imminent for the \$26m expansion of the AMSI PhD Intern program. This will deliver an expected 1400 places through till the end of 2020 and a significant percentage of these will continue to be in the mathematical sciences. A comprehensive description of the program will appear in the next *Gazette* and also be delivered direct to our members.



I completed a BSc (Hons) and secondary Dip Ed at Monash University in the 1970s and moved to La Trobe where I undertook a PhD in 1981 in geometric mechanics and Lie groups. I did a postdoc at the Institute for Advanced Study in Dublin. I've taught at RMIT, UNE and La Trobe University, where I was Head of Department a couple of times in the last decade. I worked at AMSI from 2004 through to 2006 in part as executive director to Garth Gaudry and I oversaw the introduction of the AMSI/ICE-EM Access Grid Room project. I became AMSI director in September 2009.

My research interests lie mainly in differential equations and differential geometry and I work with friends in Europe: Mike Crampin, Willy Sarlet, Olga Krupkova and Demeter Krupka.

My partner is a mathematician and we have two children with a refreshing lack of interest in mathematics. On the margins I brew beer and ride a bike.

I'm a proud Fellow of the Society and am currently a Council member and a steering committee member.

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WHERE CAN AMSI Intern TAKE YOU?

DRIVING **INDUSTRY & UNIVERSITY** COLLABORATIONS



Mathematical Research Institute MATRIX

David Wood*

MATRIX is Australia's first international and residential mathematical research institute. After a very successful start in 2016, the first MATRIX program in 2017 on hypergeometric motives has just finished at the time of writing. Participant feedback has been wonderful. The effects of research infrastructure in the form of a residential research institute are already noticeable in terms of interaction with the international community and international visibility of Australian research in the mathematical sciences. The next two MATRIX programs will be held in the winter break:

- *Computational Inverse Problems*, 11–23 June. Organisers: Tiangang Cui (Monash), Hans De Sterck (Monash), Markus Hegland (ANU), Youssef Marzouk (MIT), Ian Turner (QUT), Karen Willcox (MIT)
- *Integrability in Low-Dimensional Quantum Systems*, 26 June to 21 July. Organisers: Murray Batchelor (ANU), Patrick Dorey (Durham), Giuseppe Mussardo (SISSA Trieste), Paul Pearce (Melbourne), Chaiho Rim (Sogang, Seoul)

Five more programs are scheduled for October – December 2017. Three programs are scheduled for 2018 with more to come. It is great to see program organisers from a variety of Australian universities, including ANU, Melbourne, Monash, Newcastle, Queensland, QUT, RMIT, Sydney, UTS, UWA, Wollongong, along with a large number of international participants, including 2006 Fields Medalist, Andrei Okounkov.

**The next deadline for program proposals in 2018 or 2019 is
Friday 21 April 2017.**

Guidelines for proposals and expressions of interest (which may be submitted at any time) are available on our website www.matrix-inst.org.au.

MATRIX Programs

The MATRIX Scientific Committee selects programs on scientific excellence as well as on the participation rate of high profile international participants, among other criteria. MATRIX programs tend to have ample unstructured time to encourage collaborative research rather than having a traditional conference format. Longer term programs, lasting three weeks or more, could have an embedded conference or lecture series. Shorter workshops focussing on a special theme are also welcome. MATRIX offers additional support to participants with families through the MATRIX Family Fund.

*School of Mathematical Science, Monash University, Clayton VIC 3800.
<http://www.matrix-inst.org.au/>

MATRIX Minors

MATRIX Minor programs are self-funded visits to MATRIX to make use of the available office space and facilities at the Creswick Campus outside program times, for example to work intensively in a small group. Such visits are subject to the approval of MATRIX but can be arranged by sending an email request that briefly outlines the proposed research and timings.

Book Series

Each year Springer will publish a book on behalf of MATRIX dedicated to articles related to its activities. The Editorial Board consists of David Wood (editor-in-chief), Jan de Gier, Cheryl Praeger and Terence Tao. The organisers of each program appoint a guest-editor, who organises appropriate peer-review and ensures scientific quality. Articles can be peer-reviewed, containing original results, or reviews on a topic related to the program, or non-peer-reviewed expository lecture notes based on talks or activities at MATRIX. The first volume is expected to be published in September 2017.

Outreach

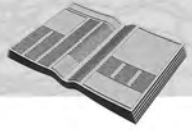
In November 2016, MATRIX hosted a residential outreach event for secondary school teachers as part of a larger outreach program sponsored by ACEMS. This event provided school teachers with the skills to run *Doing maths like a research mathematician* events. The feedback said the event was hugely successful.

Questions

Comments, suggestions and requests are always welcome. Please send these, as appropriate, to the Director, Jan de Gier (jdg@matrix-inst.org.au), Deputy Director, David Wood (davidw@matrix-inst.org.au), Manager, Sally Zanic (sallyz@matrix-inst.org.au), or the Chair of the Advisory Board, Tony Guttmann (guttmann@unimelb.edu.au).



Professor Wood's research interests lie in discrete mathematics and theoretical computer science, especially structural graph theory, extremal graph theory, graph colouring, and combinatorial geometry. He holds an ARC Future Fellowship, is an Editor-in-Chief of *The Electronic Journal of Combinatorics*, and is Deputy Director of MATRIX. He has worked at Monash University since 2012.



NCMS News

Peter Forrester*

The 60th annual conference of the Australian Mathematical Society was held on the week beginning Monday 5 December. This provided an opportunity to bring together members of the Australian mathematical sciences community for a meeting in relation to the implementation of the decadal plan. It is a formal requirement of the National Committee for the Mathematical Sciences to report on this annually.

The meeting began by me revising the decadal plan itself, extracts from the response to the decadal plan from AustMS, SSA and AAMT, as well as extracts from the minister's address at the launch. Next we heard from Louise Ryan, telling us about a Data Science initiative coming out of members of the Australian statistics community, which aims to have Data Science introduced into the secondary school curriculum, particularly at years 11 and 12. The rationale is that demand for expertise in Data Science greatly exceeds demand, that Data Science may well attract more students to STEM, and that Data Science provides motivation for the teaching of statistics.

Geoff Prince from AMSI addressed the meeting on actions undertaken in relation to the three key recommendations, relating to out-of-field teachers of mathematics, mathematics prerequisites for university bachelor programs, and a national research centre. In relation to the second, the need to both muster up grass root support from Heads of School in university mathematics departments, and to put a well-argued and well-timed case to government were emphasised. Jan de Gier gave a presentation relating to the research station initiative MATRIX, which is a joint venture between the University of Melbourne and Monash University. We also heard from Mary Myerscough on the phenomenon of post-truth, and what it might mean for advocacy in the mathematical sciences, and to wrap up the session, Steve Thornton spoke on the reSolve: Maths by Inquiry initiative.

As the anniversary of the launch of the decadal plan approaches, and with the meeting as stimulation, a call has been made to various stakeholders to make a

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formal submission relating to its implementation. These comments will be assembled to form the basis of the first report, and also to help guide future courses of action.



Peter Forrester received his Doctorate from the Australian National University in 1985, and held a postdoctoral position at Stony Brook before joining La Trobe University as a lecturer in 1987. In 1994 he was awarded a senior research fellowship by the ARC, which he took up at The University of Melbourne. Peter's research interests are broadly in the area of mathematical physics, and more particularly in random matrix theory and related topics in statistical mechanics. This research and its applications motivated the writing of a large monograph *Log-gases and Random Matrices* (PUP, Princeton) which took place over a fifteen-year period. His research has been recognised by the award of the Medal of the Australian Mathematical Society in 1993, and election to the Australian Academy of Science in 2004, in addition to several ARC personal fellowships. He was AustMS President from 2012 to 2014.

AUSTRALIAN MATHEMATICAL SCIENCES INSTITUTE

Research Report

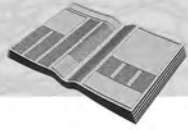
2015-16

16 workshops
with over **670** international
and domestic participants
4 major research training events
attended by **445** students
and early career researchers

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News

General News

Monash University

Darcy Best (a PhD student with Ian Wanless and Daniel Horsley) coached the Monash teams for the South Pacific Regional Finals (<https://sppregional.org/results/>) of the ACM-ICPC (International Collegiate Programming Competition). The team Monash Epsilon (consisting of Daniel Anderson, Xin Wei Chow and Peter Whalan) advanced to the ICPC World Finals (to be held in May 2017) as one of the top 130 teams in the world, having solved 8 out of 11 problems and finishing in third place behind only the teams from UNSW. The ICPC World Finals is the most prestigious and largest programming competition in the world.

Ian Wanless gave a most entertaining talk at The LaboraStory on 5 October, as part of their annual Villains Edition:

<http://thelaborastory.com/stories/professor-ian-wanless-eliyahu-rips/>.

Michael Brand's mathematical puzzles website 'Using your Head is Permitted' marks its tenth anniversary in March 2017. See: <http://www.brand.site.co.il/riddles/usingyourhead.html>.

Mathematics in the media

Some reflections on the purpose of teaching mathematics: <https://theconversation.com/what-to-say-if-your-child-asks-whats-the-point-of-maths-69628>.

Michael Brand from Monash University had an article published in *The Conversation*, 27 September 2016, entitled 'Can Facebook influence an election result?': <https://theconversation.com/can-facebook-influence-an-election-result-65541>.

This attracted a lot of interest, including an ABC News 24 TV interview (28 September; see <https://youtu.be/YE1-eH4ZsIE>), a France 24 TV interview (11 November), three radio interviews, and a quotation in the Washington Post (30 September): <https://www.washingtonpost.com/news/the-intersect/wp/2016/09/30/how-facebook-could-swing-the-election-and-who-will-benefit-if-it-does/>.

Completed PhDs

Australian National University

- Dr Adrian Dudek, *Explicit estimates in the theory of prime numbers*, supervisor: Timothy Trudgian.
- Dr Nishan (Michael) Canagasaby, *Fusion rules in logarithmic superconformal minimal models*, supervisor: David Ridout.

- Dr Kowshik Bettadapura, *Supersymmetric field theories and categorification*, supervisor: Peter Bouwknegt.

Curtin University

- Dr Lin Yee Hin, *Analysis and modelling of implied market parameters*, supervisor: Nikolai Dokuchaev.
- Dr Yee Hong Ben, *Markov and long-memory modelling of bounded financial processes: the case of a currency band*, supervisor: Nikolai Dokuchaev.

Griffith University

- Dr Venkata Vijay Kumar Maddali, *An investigation into the separation and extraction of carbon from carbon dioxide — a novel technology for processing greenhouse gas emissions*, supervisors: Gurudeo Anand Tularam and Patrick Glynn.

Monash University

- Dr Eric Zhou, *Phase transitions of some discrete models in statistical mechanics*, supervisors: Tim Garoni, Greg Markowsky and Daniel Tokarev.

Murdoch University

- Dr Hanan Abdulmotalab M Omar, *Intrusion flow into a density stratified reservoir*, supervisor: Graeme Hocking.

Queensland University of Technology

- Dr Brenda Vo, *Novel likelihood-free Bayesian parameter estimation methods for stochastic models of collective cell spreading*, supervisors: Christopher Drovandi and Tony Pettitt.
- Dr Kelly Victor, *Echocardiographic measures of pulmonary hypertension and the prediction of end-points in sickle cell disease*, supervisors: Kerrie Mengersen and Fiona Harden.
- Dr Zoe Van Havre, *Bayesian estimation of the number of components in mixture and hidden Markov models: methods and applications*, supervisors: Kerrie Mengersen and Nicole White.
- Dr Ravindra Pethiyagoda, *Mathematical and computational analysis of Kelvin ship wave patterns*, supervisors: Scott McCue and Matthew Simpson.
- Dr Samuel Patterson, *Optimising the operational energy efficiency of an open-pit coal mine system*, supervisors: Erhan Kozan and Paul Hyland.
- Dr Gnai Nishani Musfer, *Non-linear univariate and multivariate spatial modelling and optimal design*, supervisors: Helen Thompson, Rodney Wolff and Erhan Kozan.
- Dr Jeff Ching-Fu Hsieh, *Bayesian statistical models for understanding health-related outcomes for women screened for breast cancer*, supervisors: Kerrie Mengersen and James McGree.
- Dr Ava Greenwood, *Mathematical modelling of the dilute acid pretreatment of sugarcane bagasse*, supervisors: Troy Farrell and Ian O'Hara.

RMIT University

- Dr Mohammad Adib Khairuddin, *Power of posts: a quantitative analysis of Facebook election campaigning interactions*, supervisors: Asha Rao and John Postill.
- Dr Jessica Liebig, *Identifying significant behaviour in complex bipartite networks*, supervisors: Asha Rao and Kathy Horadam.

Swinburne University of Technology

- Dr Zahra Roshan Zamir, *Application of convex optimization techniques for feature extraction from EEG signals*, supervisors: Nadezda Sukhorukova and Sergey Suslov.
- Dr Karl Jackson, *Assessing player performance in Australian football using spatial data*, supervisors: Denny Meyer and Stephen Clarke.

University of New South Wales

- Dr Sabarina Shafie, *Mixed finite element methods for nonlinear equations: a priori and a posteriori error estimates*, supervisor: Thanh Tran.

University of South Australia

- Dr Nazmul Islam, *Fluid flow and particle transport through periodic capillaries*, supervisors: Bronwyn Hajek, Stan Miklavcic and Lee White.
- Dr Kylie Foster, *The biophysics of the salt stress response of plant roots. A mathematical study of passive and active transport of water and ions in plant roots*, supervisor: Stan Miklavcic.

University of Sydney

- Dr Dario Strbenac, *Novel preprocessing approaches for omics data types and their performance evaluation*, supervisor: Jean Yang.

University of Wollongong

- Dr Margo Barr, *Quality issues in multipurpose ongoing population health surveys*, supervisors: David Steel and Carole Birrell.
- Dr Sumonkanti Das, *Robust inference in poverty mapping*, supervisors: Ray Chambers and David Steel.

Awards and other achievements

Australian National University

- Professor Michael Barnsley received the 2016 Colleges of Science Award for Teaching Excellence. Michael was recognised for being an innovative educator who has influenced generations of students to embrace mathematics. His approach to teaching recognizes the different abilities of students and encourages them all to consider the open questions in fractal geometry and

chaotic dynamics. His approach is research-led and uses current research ideas to illustrate the relationship between the mathematics being taught and innovative development and translational possibilities.

Monash University

- Daniel Horsley (School of Mathematical Sciences) and Rebecca Stones (Monash Mathematics PhD graduate, adjunct researcher in the Faculty of I.T., now at Nankai University, China) have each been awarded a Kirkman Medal by the Institute for Combinatorics and its Applications. The medal is a worldwide award for outstanding discoveries by early career researchers in combinatorics. A full list of ICA awards is at https://en.wikipedia.org/wiki/Institute_of_Combinatorics_and_its_Applications.

Swinburne University of Technology

- Professor Birgit Loch (now at La Trobe University) received
 - Vice-Chancellor’s Teaching Excellence Award,
 - Faculty of Science, Engineering and Technology Teaching Excellence Award,
 - Australian Award for University Teaching.

University of New South Wales

- Dr Shane Keating was awarded a 2016 Vice Chancellor’s Award for Teaching Excellence for Contributions to Student Learning.
- Peter Brown was awarded a 2016 UNSW Science Faculty Staff Excellence Award for ‘Best Lecturer’ as voted by students.
- Martin Thompson was awarded a 2016 UNSW Science Faculty Staff Excellence Award for Excellence in research Quality in recognition of his hard work in supporting researchers throughout the Faculty of Science, providing advice and support of multiple research systems such as the Katana HPC cluster and the CCRC storage and computer systems.
- Associate Professor Chris Tisdell has been announced as one of the 15 inaugural UNSW Scientia Education Fellows.
- PhD student Thais Rodrigues was the recipient of three separate awards: the 2016 EJG Pitman Prize for the most outstanding talk by a young statistician at the annual Australian Statistical Conference; the 2016 J.B. Douglas Award at the Statistical Society of Australia’s Postgraduate Awards Day; and the UNSW School of mathematics and Statistics award for ‘best student presentation’ at our School annual postgraduate conference.

University of Sydney

- John Wormell won the prize for the best poster at the MathFest conference ‘Advances in Ergodic Theory, Hyperbolic Dynamics, and Statistical Laws’ in Canberra.
- Geordie Williamson was awarded the New Horizons in Mathematics Prize for pioneering work in geometric representation theory.

- Adrienne Jenner placed 2nd in the inaugural Three-Minute Thesis competition at the Australian Mathematical Society Meeting in Canberra.
- Daniel Hauer was acknowledged at the Australian Mathematical Society Meeting dinner for his work in organising the Three-Minute Thesis competition.
- Thomas Porter was one of two joint-winners of the Three-Minute Thesis competition at the Australian Statistical Meeting in Canberra.
- Pengyi Yang received a JG Russell Award from the Australian Academy of Sciences.

University of Wollongong

- Professor Noel Cressie was awarded the 2017 Georges Matheron Award and Lectureship from the International Association for Mathematical Geosciences.
- Professor Brian Cullis has been awarded a new five-year contract with the Grains Research & Development Corporation (GRDC) worth over \$5.7m.
- PhD student Michael Mampusti won the AustMS' Three-Minute Thesis competition. Michael is supervised by Aidan Sims and David Pask.

Appointments, departures and promotions

Australian National University

- Dr Alper Jarod departed on 15 December 2016.
- Dr Michael Rose departed on 24 December 2016.
- Associate Professor Anthony Licata was promoted from Academic Level C to Level D.
- Associate Professor Conrad Burden was promoted from Academic Level C to Level D.

Deakin University

- The School of Information Technology welcomed Maia Angelova as a professor in data analytics. She is a mathematician and comes from Northumbria University in the UK.

Federation University

- Dr Andrew Percy has been promoted to Senior Lecturer.
- Dr Julien Ugon has been promoted to Senior Lecturer.

La Trobe University

- Professor Birgit Loch from Swinburne, has accepted a Chair in teaching and learning at La Trobe University.

RMIT University

- Associate Professor Asha Rao has been promoted to Professor.

- Dr Anil Dolgun joined RMIT in February 2017 as a continuing member of staff. Anil comes from the Department of Biostatistics, Hacettepe University, Ankara, Turkey, where she was a staff member from 2004. In 2009 Anil was a Visiting Research Fellow in the Department of Mathematics and Statistics at the University of Limerick, Ireland. Anil has strong and extensive teaching record. Her research interests are in Applied Statistics, Biostatistics, Computational Statistics, Logistic Regression Analysis and Statistical Methods in Diagnostic Medicine. She has published 48 journal papers and written two book chapters.
- Dr Joanne Hall joined the School of Science (Mathematical Sciences) on 1 February 2017, as a full-time lecturer. Joanne completed her PhD at RMIT in May 2011. From June to July 2011, while awaiting the results of her thesis examination, Joanne was funded by the Slovak National Scholarship Program, to visit the Astronomical Institute of the Slovak Academy of Sciences. She then spent two years as a Post-Doc at Charles University in Prague. Joanne began as a lecturer at QUT in 2013. Despite only working part-time while raising children Joanne has managed to publish 12 papers in reputable journals and joins RMIT with an excellent teaching record.

University of New England

- Dr Imri Bokor retired at the end of 2016.

University of New South Wales

- Scott Sisson has been promoted to Professor.
- Professor Darryn Waugh has been appointed as SHARP Professor in Applied Mathematics.
- Dr Pierre Lafaye de Micheaux has been appointed as Senior Lecturer in Statistics.
- Dr Jan Zika has been appointed as Lecturer in Applied Mathematics
- Dr Jakub Stoklosa has been appointed as Lecturer in Statistics.
- The 2016 Teaching fellow Paul Hancock has returned to his school in Woonona.
- The 2017 Teaching Fellow, Margaret Clemson from Kincoppal-Rose Bay has begun her year at UNSW.

University of Southern Queensland

- Dr Nawin Raj has joined USQ in the School of Agricultural, Computational, and Environmental Sciences. His research area is in non-linear theoretical and computational fluid dynamics.

University of Sydney

- Robby Marangell and Geoff Vasil have been promoted to Senior Lecturer.
- Jennifer Chan, Florica Cirstea, Peter Kim, Stephan Tillmann, and Zhou Zhang have been promoted to Associate Professor.

University of Wollongong

- Andrew Zammit Mangion, Senior Research Fellow in NIASRA, will start on a continuing appointment as Senior Lecturer in Statistics in 2017.

Western Sydney University

- Ms Lyn Dormer and Associate Professor John MacFarlane both retired from Western Sydney University in December 2016 after very long service. Lyn had worked for Western Sydney University (in its various forms) for 25 years, and John for 35 years. Given the University has only existed for 28 years, their experience will be greatly missed.

Several new staff joined us in the course of 2016

- Dr Russell Thomson (statistical consultant, joined in January 2016 from Tasmania)
- Associate Professor Oliver Obst (data science, joined from CSIRO in February 2016)
- Dr Yi Guo (data science, joined from CSIRO in February 2016);
- Dr Huanhuan Li (path algebras, joined as an ARC-funded postdoc from the University of Science and Technology, Hefei, China, in July 2016).

New Books

Deakin University

James, S. (2016). *An Introduction to Data Analysis Using Aggregation Functions in R*. Springer. (<http://www.springer.com/gp/book/9783319467610>).

University of Southern Queensland

Hine, G., Reaburn, R., Anderson, J., Galligan, L., Carmichael, C., Cavanagh, M., Ngu, B. and White, B. (eds) (2016). *Teaching Secondary Mathematics*. Cambridge University Press.

La Trobe University and Federation University, Australia

Morris, Sidney A. (ed) (2016). *Topological Groups: Yesterday, Today, Tomorrow*. MDPI, Basel, Switzerland.

Conferences and Courses

Conferences and courses are listed in order of the first day.

Cheryl Praeger Retirement Mini-symposium

Date: 13 April 2017

Venue: Perth

Web: <http://www.cmsc.uwa.edu.au/news/cheryl-praeger-retirement-mini-symposium>

Cheryl began her career at the University of Western Australia in 1976, and has recently retired after 40 years of service.

To celebrate her amazing and influential career, there will be a mini-symposium hosted by the University of Western Australia. There will be four plenary lectures devoted to Cheryl's legacy given by some of her closest colleagues:

- Cai Heng Li (Southern University of Science and Technology China)
- Martin Liebeck (Imperial College, University of London)
- Alice Niemeyer (RWTH Aachen University)
- Jacqui Ramagge (University of Sydney)

The program and the venue will be advised. There is no registration fee, but we do ask that you let the organisers (below) know if you are attending.

Organisers: A/Prof John Bamberg (John.Bamberg@uwa.edu.au), A/Prof Michael Giudici (Michael.Giudici@uwa.edu.au).

Applied Probability @ the Rock

Dates: 17–21 April 2017

Venue: Ayers Rock Resort

Web: <http://www.maths.adelaide.edu.au/APatR/>

AP@R is an international workshop on Applied Probability, bringing together leading researchers from around the world to share recent discoveries and begin new collaborations. It also provides an opportunity to celebrate the 60th birthday of one of Australia's prominent Applied Probabilists, Professor Phil Pollett.

The workshop aims to showcase the full range of topics in Applied Probability, and includes particular themes of 'Networks in Queueing and Telecommunications', 'Stochastic Models in Biology' and 'Limits and Approximation'. These themes are reflected in the interests of the Keynote Speakers, who are Professor Frank Kelly, Professor Ruth Williams, Professor Andrew Barbour and Professor Erik van Doorn.

For further details, please see the website.

Tensor Categories and Field Theory

Date: 5–9 June 2017

Venue: University of Melbourne

Web: <https://sites.google.com/view/tensorcategories2017/home>

Recent years have seen a rich cross-fertilisation of ideas between physics and mathematics that has led to fantastic advances in each field. A prominent example of

this is the notion of a tensor category. These abstract structures have a depth and ubiquity that has made them indispensable knowledge for many modern research fields including conformal field theory and vertex algebras, knot theory, operator algebras and subfactors, quantum groups, representation theory, topological quantum field theory and, more recently, applied fields such as condensed matter physics.

This workshop will bring together a dynamic mix of high profile international experts from the mathematics and mathematical physics communities in order to disseminate this important work to graduate students and early career researchers through introductory lectures and research seminars. There will also be contributed talks from participants. There is a form at the website where you can register for this event.

MATRIX: Computational Inverse Problems

Dates: 11–23 June 2017

Venue: University of Melbourne, Water Street, Creswick, Victoria

Web: <http://www.matrix-inst.org.au/events/computational-inverse-problems/>

Registration is by invitation only. For further details, please see the website.

AMSI Optimise

Dates: 26–30 June 2017

Venue: Melbourne

Web: <http://optimise.amsi.org.au/>

New to 2017, the inaugural AMSI Optimise event aims to strengthen mathematical optimisation research engagement and its applications across industry.

AMSI Optimise will comprise a three-day industry-focused conference, followed by a two-day research workshop, featuring international guest speakers, expert and end-user talks, tutorials, collaboration showcases and industry challenge sessions.

The event is aimed at industry practitioners interested in exploring the benefits of and engagement with optimisation research, and postgraduate students and academics wanting to better understand industry drivers and needs in this area.

AMSI Winter School 2017: Computational Foundations of Data Science

Dates: 26 June to 7 July 2017

Venue: QUT

Web: <http://ws.amsi.org.au/>

For further details, see the AMSI Director's report in this issue.

Mathematics-in-Industry for New Zealand 2017

Date: 26–30 June 2017

Venue: Massey University, Palmerston North, New Zealand

Web: <http://www.minz.org.nz>

For further details, see the website, or the article in this issue.

MATRIX: Integrability in Low-Dimensional Quantum Systems

Dates: 26 June to 21 July 2017

Venue: University of Melbourne, Water Street, Creswick, Victoria

Web: <http://www.matrix-inst.org.au/events/integrability-in-low-dimensional-quantum-systems/>

Registration is by invitation only. For further details, please see the website.

MERGA 40

Dates: 2–6 July 2017

Venue: Monash University, Clayton

Web: <http://tiny.cc/merga40>

Further details are in a separate article in this issue.

The International Conference on Robust Statistics

Dates: 3–7 July 2017

Venue: University of Wollongong

Web: <http://niasra.uow.edu.au/icors2017/index.html>

The aim of this annual conference is to bring together researchers and practitioners interested in robust statistics, data analysis and related areas. This includes theoretical and applied statisticians as well as data analysts from other fields, and leading experts as well as junior researchers and graduate students.

The ICORS meetings create a forum to discuss recent progress and emerging ideas in statistics and encourage informal contacts and discussions among all the participants. They also play an important role in maintaining a cohesive group of international researchers interested in robust statistics and related topics, whose interactions transcend the meetings and endure year round.

The conference welcomes contributions to applied statistics as well as theoretical statistics, and in particular new problems related to robust statistics and data analysis.

Harmonic Analysis and PDE

Dates: 17–21 July 2017

Venue: Macquarie University

Web: <http://research.amsi.org.au/events/event/harmonic-analysis-pde/>

Harmonic Analysis and Partial Differential Equations (PDEs) have important roles in fundamental and applied mathematical research with extensive applications to other research fields such as complex analysis, mathematical modelling, signal processing, medical imaging.

This workshop, organised on the occasion of Professor Xuan Duong turning 60 in 2017, will bring the leading experts from all over the world, including USA, Europe, China, Japan, to Australia to be together with Australian experts as well as early career researchers and PhD students. The reports to be presented will

be the most recent significant developments and future directions of Harmonic Analysis and PDEs. The workshop will also provide time and ample opportunities for discussions, research collaborations for the participants, and foster potential collaborations in the future.

28th International Workshop on Combinatorial Algorithms

Dates: 17–21 July 2017

Venue: Newcastle

Web: <https://carma.newcastle.edu.au/meetings/iwoca/>

This is a very special IWOCA, dedicated to the memory of Professor Mirka Miller. For further details, please see the website.

12th International Conference on Fixed Point Theory and its Applications

Dates: 24–28 July 2017

Venue: Harbourview Function Centre, Newcastle

Web: <https://carma.newcastle.edu.au/meetings/icfpta/>

Dedicated to the memory of Jonathan M. Borwein in recognition of his prodigious contributions to nonlinear analysis.

Celebrating William (Art) Kirk's 80th birthday and the 70th birthday of Brailey Sims.

The purpose of ICFPTA 2017 is to bring together leading experts and researchers in fixed point theory and to assess new developments, ideas and methods in this important and dynamic field. A special emphasis will be put on applications in related areas, as well as other sciences, such as the natural sciences, medicine, economics and engineering.

WIMSIG Conference 2017: Celebration of Women in Australian Mathematical Sciences

Dates: 24–26 September 2017

Venue: University of South Australia, Adelaide

Web: www.austms.org.au/WIMSIG-conference-2017

For 2017, WIMSIG is organising a Celebration of Women in Australian Mathematical Sciences research conference, showcasing the research of women in the mathematical sciences. This will be the first such conference in Australia. The conference is open to people of any gender, but all the research presentations will be given by women.

'Mathematical sciences' will be broadly interpreted to include pure mathematics, applied mathematics, mathematical statistics, applied statistics, biostatistics, bioinformatics, mathematical biology, mathematics in industry, etc.

We are planning special sessions, plenary speakers, a poster session, a conference dinner, a panel on gender equity in the mathematical sciences and beyond, and a professional development workshop. Childcare will be available.

WIMSIG believes this conference will play a really important role in advancing gender equity in Australian mathematical sciences. Both female researchers and senior leaders (of any gender) in our discipline will find it eye-opening and inspiring to be in a majority-female research environment, even for a few days; not to mention the development of potential research collaborations, networking, exposure to potential candidates for hiring, etc.

Information about registration and submission of abstracts will be available soon.

Organising Committee

- Associate Professor Lesley Ward, University of South Australia,
Email: Lesley.Ward@unisa.edu.au
- Dr Giang Nguyen, University of Adelaide,
Email: Giang.Nguyen@adelaide.edu.au
- Professor Lynn Batten, Deakin University,
Email: Lynn.Batten@deakin.edu.au

Administration

- Ms Sue Tyerman, University of South Australia,
Email: ITEE-OUA.Academic.Services@unisa.edu.au

Jonathan M. Borwein Commemorative Conference

Dates: 25–29 September 2017

Venue: Noah's On The Beach, Newcastle, NSW

Web: <https://carma.newcastle.edu.au/meetings/jbcc/>

This conference will be held to commemorate the life and work of Jonathan M. Borwein. It will be devoted to five areas to which Jonathan Borwein made an outstanding contribution:

- Applied Analysis, Optimisation and Convex Functions (chairs: Regina Burachik and Guoyin Li)
- Education (chairs: Judy-anne Osborn and Naomi Borwein)
- Experimental Mathematics and Visualisation (chair: David Bailey)
- Financial Mathematics (chair: Qiji (Jim) Zhu)
- Number Theory, Special Functions and Pi (chair: Richard Brent)

Talks are by invitation only.

MATRIX: Elliptic Partial Differential Equations of Second Order: celebrating 40 years of Gilbarg and Trudinger's book

Dates: 16–28 October 2017

Venue: University of Melbourne, Water Street, Creswick, Victoria

Web: <http://www.matrix-inst.org.au/events/elliptic-differential-equations-of-second-order/>

Registration is by invitation only. For further details, please see the website.

MATRIX: Combinatorics, Statistical Mechanics, and Conformal Field Theory

Dates: 29 October to 18 November 2017

Venue: University of Melbourne, Water Street, Creswick, Victoria

Web: <http://www.matrix-inst.org.au/events/combinatorics-statistical-mechanics-and-conformal-field-theory/>

Registration is by invitation only. For further details, please see the website.

Mathematics of Risk

Date: 20 November to 8 December 2017

Venue: University of Melbourne, Water Street, Creswick, Victoria

Web: <http://www.matrix-inst.org.au/events/mathematics-of-risk/>

Registration is by invitation only. For further details, please see the website.

Incorporating workshop on mathematical modelling of risk and contiguous topics.

Date: 27 November to 1 December 2017

Venue: as above.

Tutte Centenary Retreat

Dates: 26 November to 2 December 2017

Venue: University of Melbourne, Water Street, Creswick, Victoria

Web: <http://www.matrix-inst.org.au/events/tutte-centenary-retreat/>

Registration is by invitation only. For further details, please see the website.

5th International Combinatorics Conference (5ICC)

Dates: 4–9 December 2017

Venue: Monash University, Clayton campus

Web: <http://www.monash.edu/5icc/>

5ICC is the fifth in a series of major combinatorics conferences that are run once per decade by the Combinatorial Mathematics Society of Australasia. Researchers in any area of combinatorics (interpreted broadly) are warmly invited. Students are also encouraged to attend, and there will be a prize for the best student talk.

Plenary Speakers:

- Bill Chen, Nankai University
- Maria Chudnovsky, Princeton University
- Charlie Colbourn, Arizona State University
- Marston Conder, University of Auckland
- David Eppstein, University of California, Irvine
- Joanna Fawcett, Cambridge University
- Jacob Fox, Stanford University
- Daniela Khn, Birmingham University
- Barbara Maenhaut, University of Queensland
- Brendan McKay, Australian National University

- Alexander Scott, Oxford University
- Paul Seymour, Princeton University
- Le Anh Vinh, Vietnam National University

In the week prior to 5ICC, the Tutte Centenary Retreat will be held at The Mathematical Research Institute MATRIX to celebrate 100 years since the birth of Bill Tutte.

AustMS 2017: 61st Annual Meeting

Dates: 11–14 December 2017

Venue: Macquarie University

Local Organising Committee: Paul Smith and Xuan Duong.

Further details to come.

Geometric R-matrices

Dates: 17–22 December 2017

Venue: University of Melbourne, Water Street, Creswick, Victoria

Web: <http://www.matrix-inst.org.au/events/geometric-r-matrices/>

Registration is by invitation only. For further details, please see the website.

Non-equilibrium Systems and Special Functions

Dates: 7 January to 2 February 2018

Venue: University of Melbourne, Water Street, Creswick, Victoria

Web: <http://www.matrix-inst.org.au/events/non-equilibrium-systems-and-special-functions/>

Registration is by invitation only. For further details, please see the website.

MATRIX: Month of Mathematical Biology

Dates: 27 June to 20 July 2018

Venue: University of Melbourne, Water Street, Creswick, Victoria

Web: <http://www.matrix-inst.org.au/events/month-of-mathematical-biology/>

Registration is by invitation only. For further details, please see the website.

Vale

James J. Cross

With regret, we inform members of the death on 6 January 2017 of Dr Jim Cross, a long-serving staff member of the University of Melbourne. He was a versatile lecturer, eager to learn and teach a variety of subjects. He was also the Society's archivist for a number of years.

Robert Aitken Bryce

With deep regret we inform members of the death on 26 January 2017 of Dr Bob Bryce. Bob was a member of the Society for over 50 years and served the Society in many ways, including as a member of Council and as the inaugural Chair of the Standing Committee on Mathematics Education. He was actively involved with the Australian Mathematical Olympiad Committee and related bodies, representing the Society on their committees for many years. Cheryl Praeger has provided the following information about his work in this area.

Bob was on both the AMC and MCYA Problems committees for many years, almost since their inception. And one of the strongest contributors, not only in posing problems of his own, but providing insight to others. He was 30 years on the AMC committee (1980–1987 and 1990–2011). For the MCYA Committee he was a foundation member and served all 23 years, 1990 to 2012. He was also on other committees, including the Advisory Committee representing AustMS for many years and AMOC. For AMOC he served 1991 to 2012, 22 years in total, the first 8 years representing AustMS, the last 14 representing MCYA. For a number of years, Bob was the mainstay of the Canberra Friday night mathematics enrichment group. Mike Newman and Laci Kovacs founded this many years ago. In 1988 the group shifted its focus to Tournament of Towns. From then it was run by a committee of four: Mike Newman, Malcolm Brooks, Bob Bryce and Peter Taylor. For a decade Bob was the main coordinator, arranging mathematicians from DSTO.

Visiting mathematicians

Visitors are listed in alphabetical order and details of each visitor are presented in the following format: name of visitor; home institution; dates of visit; principal field of interest; principal host institution; contact for enquiries.

Mr James Booth; Cornell University; 13 February to 31 May 2017; ANU; Alan Welsh

A/Prof Hayato Chiba; Kyushu Uni; 24 February to 2 March 2017; applied; USN; Nalini Joshi

A/Prof Ruth Corran; The American University of France; 18 January to 30 June 2017; pure; USN; David Easdown

Dr A.E.L. Davis; University College London; 1 January to 31 December 2017; ANU; Lilia Ferrario

Prof Hendrik De Bie; Ghent; 3–7 April 2017; algebra; USN; Kevin Coulembier
Ms Li Deng; Central Southern University, China; 21 November 2016 to 20 November 2018; CUT

Professor Semen Dyatlov; MIT School of Science; 24 March to 5 April 2017; ANU; Andrew Hassell

Dr Richard Garner; MQU; 23 January to 3 February 2017; pure; USN; Anthony Henderson

- Mr Yongyi Gu; Guangzhou University, China; 25 October 2016 to 31 October 2017; CUT
- Prof Derek Holt; 7 January to 16 March 2017; MAGMA; USN; John Cannon
A/Prof Enkhbayar Jamsranjav; National University of Mongolia; 16 January to 19 March 2017; CUT
- Mr Lars Jensen; Max Planck Institute for Mathematics; 1 February to 30 April 2017; pure; USN; Geordie Williamson
- Dr DE Zhou Kong; Shandong Agricultural University; February 2016 to February 2017; CUT; applied differential equations contact; Ph: 92663534
- A/Prof Nicole Lemire; University of Western Ontario; 30 January to 16 April 2017; pure; USN; Gus Lehrer
- Dr Ming Liu; South China University of Technology, Guangzhou; 27 February to 29 March 2017; pure; USN; Alexander Molev
- Dr Xia Liu; Henan Normal University, China; 1 September 2016 to 31 August 2017; SUT; applied mathematics, dynamical systems; Tonghua Zhang
- Dr Yong Liu; Wuhan University of Science and Technology; June 2016 to June 2017; CUT; applied finance and economics; Ph: 92663534
- A/Professor De Xiang Ma; North China Electric Power University; March 2016 to March 2017; CUT; applied differential equations; Ph: 92663534
- Prof Elisabetta Maluta; Politecnico di Milano; 30 July to 5 August 2017; functional analysis; FedUni; David Yost
- Dr Tobias Neckel; Technische Universität München; 17 February to 16 April 2017; ANU; Markus Hegland
- A/Prof Shahar Nevo; Bar-Ilan University; 7 February to 14 March 2017; applied; USN; Milena Radnovic
- Mr Leonardo Patimo; Max Planck Institute for Mathematics; 1 February to 30 April 2017; pure; USN; Geordie Williamson
- Prof Dmitry Pelinovsky; McMasters University; 1 January to 30 June 2018; applied; USN; Nalini Josh
- Prof Shige Peng; 27 February 2017 to 13 March 2017; fine maths; USN; Marek Rutkowski
- Professor David Penneys; University of Toronto; 18–26 March 2017; ANU; Scott Morrison
- Mr James Reoch; Adelaide; 3 August 2015 to 31 December 2017; applied; USN; Peter Sehoon Kim
- A/Prof Ege Rubak; Aalborg University, Denmark; 29 November 2016 to 30 May 2017; CUT
- Mr Yu Shen; Tongji University; 1 December 2016 to 30 April 2017; stats; USN; Qiyang Wang
- A/Prof Scott Sisson; UNSW; 9 January to 3 February 2017; stats; USN; Anthony Henderson
- Mr Dingshi Tian; Xiamen University; 25 February to 25 May 2017; statistics; USN; Qiyang Wang
- A/Prof Peter Tingley; Loyola University; 9 January to 24 March 2017; pure; USN; Oded Yacobi
- Dr Rodrigo Trevino; City University of New York; 7 February to 31 March 2017; ANU; Michael Barnsley

- Ms Jun Wang; University of Science and Technology of China; 1 October 2015 to 1 March 2017; ANU; Ben Andrews
- Ms Pei Wang; Central South University, China; July 2016 to June 2018; CUT; stochastic optimisation; Ph: 92663534
- Mr Alex Weekes; 30 January to 4 March 2017; pure; USN; Oded Yacob
- Dr Simon Wood; 20 August 2016 to 31 December 2017; ANU; Peter Bouwknecht
- Dr Jeroen Wouters; 25 February 2015 to 24 February 2017; applied; USN; Georg Gottwald
- Prof. Yonghui Xia; Huaqiao University, China; 20 March to 3 April 2017; differential equations and dynamic systems; SUT; Tonghua Zhang
- Dr Ying Xu; Hefei University of Technology; 1 September 2015 to 31 August 2017; pure; USN; Ruibin Zhang
- Dr Oksana Yakimova; Friedrich-Schiller-Univ., Jena, Germany; 12 February to 18 March 2017; pure; USN; Alexander Molev
- Prof Clemente Zanco; Università di Milano; 30 July to 5 August 2017; functional analysis; FedUni; David Yost
- Dr Hong-Bing Zeng; Hunan University of Technology; March 2016 to February 2017; sampled-data synchronization control for chaotic neural networks under actuator saturation; CUT; Ph: 92663534
- Mr Yang Zhang; University of Science and Technology, China; 1 October 2015 to 30 September 2017; pure; USN; Ruibin Zhang
- Dr Xuwen Zhu; Stanford University; 24 March to 5 April 2017; ANU; Andrew Hassell
-

AMSI
17

**WINTER
SCHOOL**
ON —————
**COMPUTATIONAL
FOUNDATIONS OF
DATA SCIENCE** —————

26 JUNE – 7 JULY
QUEENSLAND UNIVERSITY OF TECHNOLOGY

W S . A M S I . O R G . A U



AMSI RESEARCH



Nominations sought for the 2017 AustMS Medal

The Medal Committee for the 2017 Australian Mathematical Society Medal is now seeking nominations and recommendations for possible candidates for this Medal, which will be awarded to a member of the Society, under the age of 40, for distinguished research in the Mathematical Sciences.

Nominations close on **26 May 2017** and should be sent to <http://journal.austms.org.au/ojs/index.php/AMPA/login>. Nominators should receive an acknowledgement of the nomination: if this is not received, please contact the Committee Chair.

Nominations will not be automatically rolled over from previous years.

For further information, please contact the Chair of the 2017 AustMS Medal Committee, Professor P.J. Forrester (pjforr@unimelb.edu.au). The other members of the 2017 Medal Committee are Professor P.G. Bouwknegt (Outgoing Chair), Dr C.M. O'Keefe (Incoming Chair) and Professor A. Henderson (one year).

See <http://www.austms.org.au/AMSInfo/medal.html> for a list of past AustMS Medal winners.

Rules for the Australian Mathematical Society Medal

1. There shall be a Medal known as “The Australian Mathematical Society Medal”.
2.
 - (i) This will be awarded annually to a Member of the Society, under the age of 40 on 1st January of the year in which the Medal is awarded, for distinguished research in the Mathematical Sciences. The AustMS Medal Committee may, in cases where there have been significant interruptions to a mathematical career, waive this age limit by normally up to five years.
 - (ii) A significant proportion of the research work should have been carried out in Australia.
 - (iii) In order to be eligible, a nominee for the Medal has to have been a member of the Society for the calendar year preceding the year of the award; back dating of membership to the previous year is not acceptable.
3. The award will be approved by the President on behalf of the Council of the Society on the recommendation of a Selection Committee appointed by the Council.
4. The Selection Committee shall consist of 3 persons each appointed for a period of 3 years and known as “Incoming Chair”, “Chair” and “Outgoing Chair” respectively, together with a fourth person appointed each year for one year only.
5. The Selection Committee will consult with appropriate assessors.
6. The award of the Medal shall be recorded in one of the Society’s Journals along with the citation and photograph.

7. The Selection Committee shall also prepare an additional citation in a form suitable for newspaper publication. This is to be embargoed until the Medal winner has been announced to the Society.
8. One Medal shall be awarded each year, unless either no one of sufficient merit is found, in which case no Medal shall be awarded; or there is more than one candidate of equal (and sufficient) merit, in which case the committee can recommend the award of at most two Medals.

Nominations sought for the 2017 Gavin Brown Prize

The 2017 Gavin Brown Prize Selection Committee is now seeking nominations and recommendations for possible candidates for this prize, to be awarded for an outstanding and innovative piece of research in the mathematical sciences published by a Member or Members of the Society. The award will be for a single article, monograph or book consisting of original research, and published in the nine calendar years 2007–2015.

Nominators should provide a brief (1–2 pages) summary of what makes the nominated publication important and original, with appropriate references to prior or subsequent work in the field. They should also suggest the names of three assessors.

Nominations close on **26 May 2017** and should be sent to <http://journal.austms.org.au/ojs/index.php/AMPA/login>. Nominators should receive an acknowledgement of the nomination: if this is not received, please contact the Committee Chair.

For further information, please contact the Chair of the 2017 Gavin Brown Prize Selection Committee, Professor J. Ramagge (jacqui.ramagge@sydney.edu.au). The other members of the 2016 AustMS Gavin Brown Prize Selection Committee are Professor J.F. Grotowski (Outgoing Chair), Professor S.O. Warnaar (Incoming Chair) and Professor P. Solomon (one year).

See <http://www.austms.org.au/Gavin+Brown+Prize+winners> for a list of past Gavin Brown Prize winners.

Rules for the Gavin Brown Prize

1. The Gavin Brown Prize will be awarded annually for an outstanding and innovative piece of research in the mathematical sciences published by a Member or Members of the Society.
2. Each award will be for a single article, monograph, or book, consisting of original research, and published in the 9 calendar years $Y - 10$ to $Y - 2$, where Y is the year of the award.
3. To be eligible for the award of the Gavin Brown Prize, a publication must have at least one author who must
 - (i) be a member of the Society, and have been a member of the Society for the calendar year at the time of publication of the paper (back-dating of membership is not allowed);

- (ii) normally be resident in Australia, and have been normally resident in Australia at the time when the research was carried out.
- 4. In the case of publications with multiple authors, the prize will be shared by all authors. The existence of authors who do not meet the conditions in Rule 3 will not preclude this award, although the Selection Committee may take it into account in assessing the achievement of the author(s) who do meet those conditions.
- 5. The Selection Committee may deem a publication ineligible if an author has previously received an award from the Australian Mathematical Society for a body of research which included the publication in question.
- 6. Nominations for the Gavin Brown Prize will be called for in the first half of each year. A publication may be nominated for the award by any member of the Society who is not an author of that publication.
- 7. The award will be decided by a Selection Committee appointed by the Council.
- 8. The Selection Committee will consist of 4 persons:
 - (i) 3 persons each appointed for a period of 3 years, namely a Chair, an Incoming Chair who will become the Chair in the following year, and an Outgoing Chair who has been the Chair in the preceding year;
 - (ii) 1 person appointed for one year only.
- 9. The Selection Committee may consult with appropriate external assessors. Nominators are requested to suggest names of three assessors.

News from the annual conference

The Society's 60th Annual Meeting was held in December at the Australian National University. The Director, Professor John Urbas, his team of local organisers and the Program Committee, led by the Vice-President (Annual Conferences), were responsible for a very successful conference, which included a public lecture by Terry Speed in memory of Peter Hall.

The following matters from the meeting are provided here for the information of those who could not attend.

1. The George Szekeres Medal for 2016 was awarded jointly to Professor Jim Hill of the University of South Australia and Professor Gus Lehrer of The University of Sydney.
2. The Australian Mathematical Society Medal for 2016 was awarded to Professor Aidan Sims of the University of Wollongong.
3. The Gavin Brown Prize for 2016 was awarded to Professor George Willis of Newcastle University for his paper with Yehuda Shalom 'Commensurated Subgroups of Arithmetic Groups, Totally Disconnected Groups and Adelic Rigidity', *Geometric and Functional Analysis* 23 (2013), no. 5, 1631–1683.

4. Council awarded Honorary Membership of the Society to Professor A.L. Carey in recognition of his outstanding work for the Society and for mathematics in Australia.
5. The 2015 B.H. Neumann Prize was awarded to Hao Guo (University of Adelaide) for his talk *Spin-c, K-homology and Proper Actions*.

Honourable mentions were given to Anthony Carapetis (Australian National University), Sean Carnaffan (University of Sydney), Scott Lindstrom (University of Newcastle) and Trang Thi Thien Nguyen (University of South Australia).

6. There was an Early Career Workshop, organised by Michael Coons and Norman Do, on the Saturday and Sunday before the conference. Following advice from the organisers of the short 2015 Early Career Workshop, Council decided there will not be a short Early Career Workshop in 2017 but that the Early Career Representatives be asked to suggest a replacement activity to support early career researchers.
7. There was a successful *Women in Mathematics Dinner* on the Sunday preceding the conference.
8. At the AGM, it was confirmed that the sixty-first Annual Meeting of the Society will be held at Macquarie University from Tuesday 12 December to Friday 15 December 2017 with Professor P.D. Smith and Professor X.T Duong as Co-Directors.

It was provisionally determined that the sixty-second Annual Meeting of the Society will be held at the University of Adelaide from Tuesday 4 December to Friday 8 December 2018 with Dr T. Leistner as Director.

9. Council decided to establish a working party, chaired by Professor Aidan Sims, to examine the London Mathematical Society's Good Practice Scheme and to recommend actions to improve gender equity, with a focus on changes to Society practices.
10. Council decided, as a first step in deciding on a suitable general structure for a revamped website, to engage a consultant to provide advice.

Peter Stacey
AustMS Secretary
Email: P.Stacey@latrobe.edu.au



Peter Stacey joined La Trobe as a lecturer in 1975 and retired as an associate professor at the end of 2008. Retirement has enabled him to spend more time with his family while continuing his interest in mathematics. He took over as secretary of the Society at the start of 2010.

The Australian Mathematical Society

President:	Professor Tim Marchant, FAustMS	Dean of Research University of Wollongong NSW 2522, Australia. tim_marchant@uow.edu.au
Secretary:	Dr P. Stacey	Department of Mathematics and Statistics La Trobe University Bundoora, VIC 3086, Australia. P.Stacey@latrobe.edu.au
Treasurer:	Dr A. Howe	Department of Mathematics Australian National University Acton, ACT 0200, Australia. algy.howe@maths.anu.edu.au
Business Manager:	Ms May Truong	Department of Mathematics Australian National University Acton, ACT 0200, Australia. office@austms.org.au

Membership and Correspondence

Applications for membership, notices of change of address or title or position, members' subscriptions, correspondence related to accounts, correspondence about the distribution of the Society's publications, and orders for back numbers, should be sent to the Treasurer. All other correspondence should be sent to the Secretary. Membership rates and other details can be found at the Society web site: www.austms.org.au.

Local Correspondents

ANU:	S. Koh	Southern Cross Univ.:	G. Woolcott
Aust. Catholic Univ.:	B. Franzsen	Swinburne Univ. Techn.:	N. Sukhorukova
Bond Univ.:	N. de Mestre	Univ. Adelaide:	T. Mattner
Central Queensland Univ.:	<i>Vacant</i>	Univ. Canberra:	P. Vassiliou
Charles Darwin Univ.:	I. Roberts	Univ. Melbourne:	B. Hughes
Charles Sturt Univ.:	P. Charlton	Univ. Newcastle:	J. Turner
CSIRO:	R.S. Anderssen	Univ. New England:	B. Bleile
Curtin Univ.:	L. Caccetta	Univ. New South Wales:	D. Combe, Q.T. Le Gia
Deakin Univ.:	L. Batten	Univ. Queensland:	H.B. Thompson
Edith Cowan Univ.:	U. Mueller	Univ. South Australia:	Y. Kaya
Federation Univ.:	D. Yost	Univ. Southern Queensland:	T. Langlands
Flinders Univ.:	R.S. Booth	Univ. Sunshine Coast:	P. Dunn
Griffith Univ.:	A. Tularam	Univ. Sydney:	P. Kim
James Cook Univ.:	S. Belward	Univ. Tasmania:	B. Gardner
La Trobe Univ.:	K. Seaton	Univ. Technology Sydney:	S. Woodcock
Macquarie Univ.:	A. Sikora	Univ. Western Australia:	C. Walker
Monash Univ.:	A. Haley, G. Farr	Univ. Wollongong:	J. McCoy
Murdoch Univ.:	M. Lukas	UNSW Canberra:	H. Sidhu
Queensland Univ. Techn.:	M. Simpson	Victoria Univ.:	A. Sofo
RMIT Univ.:	Y. Ding	Western Sydney Univ.:	A. Francis

Publications

The Journal of the Australian Mathematical Society

Editor: Professor George Willis
School of Mathematical and Physical Sciences
University of Newcastle, NSW 2308, Australia

The ANZIAM Journal

Editor: Professor Andrew Bassom
School of Mathematics and Physics
University of Tasmania, Australia

Editor: Professor Graeme Hocking
School of Chemical and Mathematical Sciences
Murdoch University, WA 6150, Australia

Bulletin of the Australian Mathematical Society

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ISSN: 0311-0729

Published by The Australian Mathematical Publishing Association Incorporated
Typeset in Australia by TechType, ACT
Printed in Australia by Union Offset Printers, ACT

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