

Volume 47 Number 4 2020

The Australian Mathematical Society

Gazette

David Yost and Sid Morris (Editors)

Gazette of AustMS, CIAO,
Federation University Australia, PO Box 663,
Ballarat, VIC 3353, Australia

Eileen Dallwitz (Production Editor)

E-mail: gazette@austms.org.au
Web: www.austms.org.au/gazette
Tel: +61 3 5327 9086

The individual subscription to the Society includes a subscription to the *Gazette*. Libraries may arrange subscriptions to the *Gazette* by writing to the Treasurer. The cost for one volume consisting of five issues is AUD 118.80 for Australian customers (includes GST), AUD 133.00 (or USD 141.00) for overseas customers (includes postage, no GST applies).

The *Gazette* publishes items of the following types:

- 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

Local correspondents submit news items and act as local Society representatives. Material for publication and editorial correspondence should be submitted to the editors. Any communications with the editors that are not intended for publication must be clearly identified as such.

Notes for contributors

Please send contributions to gazette@austms.org.au. Submissions should be fairly short, easy to read and of interest to a wide range of readers.

Please typeset technical articles using \LaTeX or variants. In exceptional cases other editable electronic formats such as plain text or Word may be accepted. Please do not use definitions in your \TeX files, as they may conflict with our style files. If you find such definitions convenient, please use a text editor to reinstate the standard commands before sending your submission.

Please supply diagrams as vector images (not bitmaps) where possible, as postscript (.ps) or encapsulated (.eps) files. Please supply photos at high-resolution (i.e. at least 400 pixels per inch (16 pixels per mm) at the final size of reproduction. For example, if the image is to be printed at 90 mm wide, it must be at least 1400 pixels wide. If JPEG format is used, images must be created with a high quality factor, i.e. artefacts such as halos of dots or jagged edges should not be obtrusive at high magnification. For more information, see *An Introduction to Computer Images* at delta-intkey.com/www/images.htm.

Deadlines for the *Gazette* are 1 February for No. 1 (March), 1 April for No. 2 (May), 1 June for No. 3 (July), 1 August for No. 4 (September), and 1 October for No. 5 (November).

For more information, visit www.austms.org.au/gazette.

Volume 47 Number 4

2020

- 172 Editorial
Sid Morris
- 175 President's Column
Jacqui Ramagge
- 177 Letter to the Editors
Definition of mathematics
Keith Tognetti
- 178 Puzzle Corner 64
Peter M. Higgins
- 181 An interview with Dr Fatemeh Ansarzadeh
Masoud Kamgarpour
- 184 An interview with Dr Hoa Bui
Masoud Kamgarpour
- 187 Meeting the Parliament: a mathematician's experience
Masoud Kamgarpour
- 190 Mathematical Research Institute MATRIX
Tom Keegan
- 192 SMRI News
Anthony Henderson
- 195 News
- 206 AustMS



Editorial

David and I welcome you to the September issue of the Gazette of the Australian Mathematical Society. Before describing the content of this issue, I thought it might be interesting to some if I described my own experience in 2020, much of which has been under Australia's strictest lockdown, in Melbourne.

I retired from the University of Ballarat 10 years ago, after 40 years as an academic, half of which I spent as Professor and Head of Department, Dean or Deputy Vice-Chancellor. On retirement, I recognized the need to keep my body and mind active. I have always loved research and so I decided to continue doing research as long as I could. I also enjoyed writing maths books and planned, as many retired academics do, to continue writing books. Probably the book of mine I love the most is the free online book *Topology Without Tears*, which is over 750 pages now and translated into several languages. The book has an associated Facebook group of about 10,000 students and academics throughout the world and 10 YouTube videos. The interaction with so many people is a lot of fun. An advantage of an online book is that you can correct typos and errors and make additions as often as you like. Normally I visit both Federation University Australia and La Trobe University as often as I can and I try to give seminars there when I have a topic I think would be of interest. Therefore it is a great disappointment that I have not been able to visit either university for most of 2020.

Universities in 2020 are not the happiest places, however. Academics have been forced to teach online at very little notice. And what is much worse, many will lose their jobs because of the lack of income from international students as Australia's borders are closed. Already over 10,000 academics have lost their jobs and many will never work in a university again.

Being retired I have not had to worry about losing my job or teaching online. But I decided I must keep sane in lockdown by making sure I was very busy with mathematics (and my other interests, including three young grandchildren). Unable to go regularly to the gym, I took up exercise classes on Zoom. In 2020 before I completed the fourth edition of my 1030 page research monograph *The Structure of Compact Groups* with my co-author of 45 years, Karl Heinrich Hofmann, and it has recently appeared. I wrote an article called "Hilbert 13: Are there any genuine continuous multivariate real-valued functions?", of which as an exposition I am quite proud and it will appear in the January 2021 issue of the Bulletin of the American Mathematical Society and is already freely available online. I have also had accepted some other research papers, I need not discuss here.

Decades ago I co-authored the book *Abstract Algebra and Famous Impossibilities* with Arthur Jones and Ken Pearson, both now deceased. The book was published by Springer, and I recently approached Springer about publishing an expanded updated edition of the book and they were enthusiastic and so I will be soon working on that.

But being a glutton for punishment, I decided to move out of my comfort zone and write a book called *Probability Theory Without Tears* which is a rigorous introduction to probability theory addressed at even those who do not have a solid mathematical background. I have written 100 pages of this book and it has some quite pretty material. I plan for it to be an online book, so it is written to be read on a screen — a computer screen or a tablet or even a phone. The beauty is that I can easily update, correct, or add material and its length is not a critical element, and it can contain as much colour as I wish as it is online. I started a Facebook group early this year for this book and it already has over 2,000 members. I interact with the members and this impacts on what content is to be included in the book.

I continue my editorial activity, not only jointly editing the Gazette, but also being on the editorial boards of several journals and even editing Special Issues and refereeing more research papers for journals around the world than I wish to.

Finally, I should mention that as we all know Zoom allows us to connect with others very easily. I recently attended the 9th International Eurasian Conference on Mathematical Sciences (IECMSA-2020), and enjoy other seminars on Zoom including one series on topological groups emanating from Hawaii and those made available by MATRIX. All in all, I am indeed keeping busy under lockdown and continue to enjoy my retirement very much.

After that indulgence, I should now say a few words about the contents of this issue. Firstly I mention a Letter to the Editors by my dear friend Keith Tognetti. Keith is seeking a definition of mathematics. We would be happy to hear your thoughts on a definition, and his definition, in particular. The News in this issue, as usual, reports on comings and goings, honours, promotions, completed PhDs, books published, remaining international visitors, zoom conferences, workshops, and zoom seminars. We are also reminded that the annual meeting of the Australian Mathematical Society will be held from Tuesday 8 December 2020 to Friday 11 December 2020. It will be a virtual event hosted by the University of New England. See Web: <https://www.austms.org.au/tiki-calendar.php?calitemId=901>.

As usual you will be entertained by puzzles presented in Puzzle Corner by Peter Higgins. You are encouraged to submit your solutions. The Society Secretary, Deborah Jackson, in AustMS News refers to Lift-Off Fellowship applications and AustMS accreditation. There is an interesting report on “Meeting the Parliament: a mathematician’s experience” by Masoud Kamgarpour. In the regular news item from MATRIX, Tom Keegan, reports the exciting news that ANU has joined the MATRIX partnership. Tom also reports on the activities of MATRIX. Most importantly, he calls for applications for Research Programs. Another regular news item is Anthony Henderson’s report on The Sydney Mathematical Research Institute including their Domestic Visitor Program.

Finally there are two interviews done by Masoud Kamgarpour. One is with Dr Fatemeh Ansarizadeh, 2019 Winner of the AustMS WIMSIG Maryam Mirzakhani Award. The other is with Dr Hoa Bui, 2020 Winner of the AustMS WIMSIG Maryam Mirzakhani Award. Both of these are well worth a read.

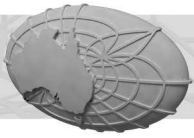
As a postscript, I should mention that the new Australian Mathematical Society website is now live at <https://austms.org.au/>.

David and I wish you an enjoyable read of this issue of the Gazette and Stay Safe.

Sid Morris, Adjunct Professor, La Trobe University;
Emeritus Professor, Federation University Australia.
Email: morris.sidney@gmail.com



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 170 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 10,000 members. In 2016 he was ordained as a Rabbi. In 2020 he published the fourth edition of his 1,000-page book *The Structure of Compact Groups*. He enjoys spending time with his three grandchildren.



President's Column

Jacqui Ramagge*

It appears 2020 is the gift that keeps on giving.

Now that a second wave of covid-19 has hit Australia, we have sadly taken the decision to hold the Annual Meeting of the Society online. We simply could not guarantee that it would be safe to hold the meeting in person, and we certainly didn't want to risk an outbreak in the mathematical community by having so many of us converge on the University of New England. On the bright side, an entirely online event will make the meeting accessible to people from all over the world in a way that it has never been before. We can use this unfortunate turn of events to reach out to our neighbours near and far and welcome them to join us virtually for our meeting.

On a less positive note, inadequate government support of the higher education sector continues to threaten the future of Australia's third-largest export category. In combination, universities are already shedding thousands of jobs and closing down hundreds of courses. In several cases, majors in the mathematical sciences have been targeted for elimination. The argument given is usually low enrolments in units, with figures such as 5 FTE (full-time equivalent students) quoted as if they are horrifying. In fact, given that students typically take 8 units per year, an enrolment of 5 FTE in a unit would mean an enrolment of 40 students. An enrolment of 40 students would be considered viable in most institutions in the country.

The government had itself already flagged the strategic importance of the mathematical sciences in its proposed funding model for university education by providing a greater proportion of the fees than for other disciplines. However, the funding model would reduce overall funding for universities as they currently stand, including for mathematical sciences degrees. So any strategic argument put by government could be countered by financial arguments from universities. Money talks, and at the moment the government is saying very little.

The funding reforms proposed by government are by no means guaranteed passage through the Houses, with a number of independents already saying they will not support the bill. It is not clear what the government will do if the legislation fails, but we would expect them to continue to try to find savings in other ways. In other words, we can expect reduced funding from government for mathematical sciences if the new funding model is introduced, and we can expect reduced funding overall if the new funding model is not introduced.

The loss of mathematical sciences majors would represent a significant loss to the country in two ways. First, it would reduce the number of mathematically and

*Email: President@austms.org.au

statistically competent graduates at a time when they are increasingly sought-after by employers. Second, it would significantly impact teacher training. As we know from past mistakes, any reduction in the number of teachers trained or the quality of their training will have repercussions for many years to come. I have already written to one university that had flagged its intentions early, and I expect to write to more in the next few days.

I suspect at this point our best option is to seek philanthropic support. In particular, I note the Tibra Foundation has funded Australia's first philanthropically-funded chair in the mathematical sciences in more than 100 years. We thank the Tibra Foundation for their generosity in supporting the mathematical sciences and congratulate the University of Wollongong on attracting the donation of \$1.25M. It would be great to see more of this type of support across the country, particularly from industries that benefit from the graduates that we produce. I encourage everybody to use their networks to try to engage donors and alumni.

Last but not least, I sadly report that on 6 September 2020, we lost our dear friend and colleague, Vaughan Jones. As the first Fields medallist from Oceania, Vaughan was an inspiration to colleagues in Australia and New Zealand, particularly those working in Operator Algebras. Vaughan was a dedicated supervisor and a strong advocate for early career researchers. Some of his students will provide us with a more extensive celebration of his life. I will restrict myself to saying: vale Vaughan, we will miss you.

We remain in extraordinary times. Please be kind to yourself and to others.

Live long and prosper 🙌



Jacqui Ramage is a Fellow of the Australian Mathematical Society with research interests across algebra, analysis, and geometry. She is currently Executive Dean of the Faculty of Science at Durham University in the UK.

Jacqui has won awards for: teaching from the University of Newcastle; research environment from the University of Wollongong; and contributions to mathematics enrichment from the Australian Mathematics Trust. She has served on various Australian Research Council panels including as Chair of the Australian Laureates Selection Advisory Committee.



Letters to the Editors

As colleagues might recall, I regularly challenge them to come through with an insightful definition that captures the essence of Mathematics and is of help to a non-mathematician.

Typical of previous attempts is

Mathematics has a threefold purpose. It must provide an instrument for the study of nature. But this is not all: it has a philosophical purpose, and, I daresay, an aesthetic purpose.

– Henri Poincaré

This is not a definition — it just lists some attributes.

I disagree with Poincaré and wish to present my definition.

This began by asking what we all have in common at university. To me the answer was immediate — the study of patterns.

The great G.H. Hardy seems to support my concept.

A mathematician, like a painter or poet, is a maker of patterns. If his patterns are more permanent than theirs, it is because they are made with ideas.

Thus engineers study patterns in engineering and biologists study patterns in biology and so on.

But what patterns do mathematicians study?

Well this leads into my definition — mathematicians study patterns for their own sake!

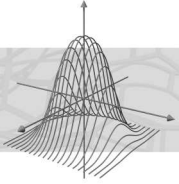
Definition of mathematics

Mathematics is

- (i) the science of patterns
- (ii) the language of patterns.

Keith Tognetti

Email: tognetti@uow.edu.au



Puzzle Corner

Peter M. Higgins*

Welcome to Puzzle Corner 64 of the Gazette of the Australian Mathematical Society. In this first section I will introduce “Remainder Shortcuts”. After that I will give a solution to Puzzle Corner 63 on “Island Problems” which benefitted from the inputs of Dr Alan Jones and David Ruxton.

I would be happy to receive your solutions to Puzzle Corner 64 not later than 30 October 2020. The email address for solutions is austmspuzzles@gmail.com. Any particularly interesting solutions will be mentioned in the next Puzzle Corner.

The Remainder theorem for polynomial division and its corollary, the Factor theorem are fundamental algebraic facts, so I was surprised to learn they had been dropped as Learning Outcomes for English A-level students. Needless to say I made sure my first-year students did not stay ignorant for long but nonetheless they remained wary of this slick little trick. This was evidenced in an examination I recently set where most candidates still did the long division in full in order to answer the remainder question. To be sure, things being the way they currently are, this summer’s exams were take home 24-hour affairs so that students could take their time and stick to old habits if that made them feel more secure.

Perhaps one of the reasons the Remainder theorem looks a bit mysterious is that it seems only to apply to division by linear factors but that is not the case. Dividing one polynomial $p(x)$ by another $a(x)$ of degree n say, yields an equation of the form $p(x) = a(x)q(x) + r(x)$ where the remainder polynomial $r(x)$ is of degree less than n . If we know the roots of $a(x)$ we may substitute them into this equation to get linear equations in the coefficients of $r(x)$ and thereby find $r(x)$ without resorting to long division. Today I invite you to try this out on $p(x) = x^6 + 2x^5 - x^4 + 6x + 5$ for the following quadratic divisors $a(x) = \dots$

Problem 1.

$$(i) x^2 + x - 2, \quad (ii) x^2 + 1, \quad (iii) 4x^2 - 4x + 1.$$

Problem 2. But it’s not really about roots and for divisors of degree greater than 2, explicit factorization is often not even possible. With that in mind, with the same $p(x)$ as before, find the remainder for the divisors $a(x) = \dots$

$$(i) x^2 - x - 1, \quad (ii) x^3 - x^2 + x - 2$$

by substituting for x^n in $p(x)$ through use of the equation $a(x) = 0$. And explain why that works.

*Email: peteh@essex.ac.uk

Island Problems and Solutions

Island Problems

Problem 1

On Triangle Island, a, b, c
 How far can anyone
 Be from the sea?

Problem 2

Or more specifically:

On Triangle Island,
 Of sides 13, 15, and 4,
 How far can the crocodile
 Stray from the shore?

(I should have warned you about the crocodile.) An interesting path to the general solution comes from showing that the answer is equal to the area of the triangle divided by half its perimeter, which is very pretty, don't you think?

Solutions

In response to the Island Problems we received correct solutions from Dr Alan Jones and David Ruxton. (Thanks to Alex Bishop for composing a draft of the solutions.) We combine their responses as follows.

Problem 1. The incircle of a triangle is the largest circle that can fit inside the triangle. The Island Problem is equivalent to finding the radius of the incircle. Let the island be given as the triangle ABC in Figure 1 where the lengths of the line segments BC , AC and AB are a , b and c , respectively. Then our answer is the radius r of the incircle centred at Z . From Figure 1 we see that the area of ABC is equivalent to the combined areas of the sub-triangles BZC , AZC and AZB , where each sub-triangle has height r , that is,

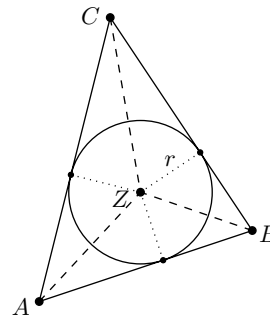


Figure 1. Inscribed circle of a triangle.

$$\begin{aligned} \text{Area}(ABC) &= \text{Area}(BZC) + \text{Area}(AZC) + \text{Area}(AZB) \\ &= \frac{r \cdot a}{2} + \frac{r \cdot b}{2} + \frac{r \cdot c}{2}. \end{aligned}$$

After rearranging the above equation, we find that

$$r = 2 \cdot \text{Area}(ABC)/p \tag{1}$$

where $p = a + b + c$ is the perimeter of the triangle.

The area of ABC may then be calculated using Heron's formula, that is,

$$\text{Area}(ABC) = \sqrt{s(s-a)(s-b)(s-c)} \quad \text{where} \quad s = \frac{a+b+c}{2}.$$

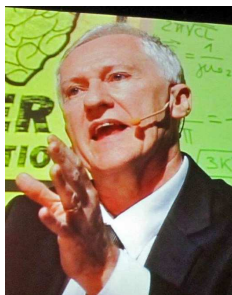
From this, we see that the maximum distance from the sea can be calculated as

$$r = \sqrt{(s-a)(s-b)(s-c)/s}.$$

where $s = (a+b+c)/2$ is half the perimeter of the triangular island.

Problem 2: If $a = 13$, $b = 15$ and $c = 4$, then $s = 16$ and thus $r = 3/2$. Then the crocodile can stray at most a distance of $3/2$ from the shore of the island.

Additional Properties: Alan Jones then considered the Pythagorean triangles $(3, 4, 5)$, $(5, 12, 13)$ and $(8, 15, 17)$ and found that the maximum distances are 1, 2, and 3, respectively. The Pythagorean triangles can be generalised as $(m^2 - n^2, 2mn, m^2 + n^2)$ where n and m are integers with $m > n > 0$. Notice that each such triple describes a right-angle triangle with area $(m^2 - n^2) \cdot (2mn)/2$. Alan then showed that the maximum distance from the sea on such an island is given by $n(m - n)$. This can be proved directly from the formula given in (1).



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.



An interview with Dr Fatemeh Ansarizadeh: 2019 Winner of the AustMS WIMSIG Maryam Mirzakhani Award*

Conducted by Masoud Kamgarpour**

1. When did you first become interested in mathematics?

When I started high school, it dawned on me that I can sit for hours and hours struggling with complicated mathematical problems without getting tired or bored. The pleasure and satisfaction of being lost in maths were beyond anything else I had experienced. I was lucky to have a highly encouraging teacher who guided me throughout this journey. Additionally, I had wonderful friends who were intelligent and hardworking students.

In fact, in Iran there are many smart and successful women who are outperforming men in engineering and mathematics. I was a part of and a beneficiary of this environment in my teenage years. Being an outstanding student, I always received compliments from my parents and teachers, which further motivated me to work even harder.

To this day, a mathematical problem can mesmerise me to a degree that makes me forget about my surroundings. I do not consider working with mathematics as just a job, and I derive tremendous satisfaction from dealing with complicated mathematical problems and coding.



*The Maryam Mirzakhani Award is a \$3000-dollar top-up scholarship with the aim of supporting international female mathematics postgraduate students in Australia. Each year the award will be made on a competitive basis by a selection committee of distinguished mathematicians, appointed by the executive committee of Australian Mathematical Society's Women in Mathematics Special Interest Group (WIMSIG). There is one round of the Maryam Mirzakhani Award per year, with the closing date 1 April. For more details, see <https://austms.org.au/awards-grants/awards/maryam-mirzakhani-award/>.

**School of Mathematics and Physics, The University of Queensland.
Email: masoud@uq.edu.au

2. Could you tell us about your life and career path so far?

I was blessed to be born in a family that placed high emphasis on education. Before I commenced primary school, my mother had taught me the alphabet. I have vivid memories of my childhood when I was practicing reading my first sentences. At that time, fancy colourful books were not common in Iran and I used to gather any parts of newspapers that I could find and learn new words, a habit that has stayed with me throughout my life.

I obtained my Master's degree in electrical engineering in Iran. After a couple of years of working in the industry, I realised that my brain craved more mathematics! Therefore, I commenced my PhD in mathematics at Swinburne University focusing on an applied mathematical project involving concepts which were totally new to me. In particular, I needed to learn some biology since my project was on modelling cancer cells regression in response to chemotherapy. Initially, some of my colleagues were surprised when they heard about my research background. But with effort, everything is possible! I completed my PhD on time and my thesis was accepted by the referees immediately without any revisions. Much to my delight, my PhD research was published in the *Applied Mathematical Modelling* journal.

3. What does your current research involve?

Currently, I am about to finish a research fellowship with an excellent team at Deakin University. Since my performance was above satisfactory, my supervisors suggested that I start a new PhD in machine learning and artificial intelligence starting in October 2020. At this stage, my focus is on heterogenous scene understanding in graph neural networks.

4. How do you achieve a balance between your work and life?

I usually get up around 6 am in the morning. The first thing I do is a 30-minute exercise routine and then I start doing some chores and preparing food. By 9 am, I have completed all my chores and the rest of day is mine!

I spend most of the day on mathematics. In the evening, I enjoying watching some TV and chatting to friends and family. By the conclusion of the day I am usually so exhausted that I fall asleep with ease at around 11:30. The inner satisfaction I get because of my productive day allows me to have a sound sleep, preparing me for another day.

5. Where do you see yourself 10 years from now?

I think about this almost every day. I have written my most important goals on a piece of paper which I keep beside me on my desk, so that I may regularly view my goals. I believe that my potentials and hard work should pave the way for a bright future. Hopefully, I will be a senior data scientist and be able to collaborate with leading universities. Besides my career, I feel that being a kind and wise mother will complete my life as a woman.

6. What advice would you offer to young women who are just starting their careers in the mathematical sciences?

In the modern world, there are many distractions for young people, especially for young women. I believe that in order to be successful it is important that one thinks of long-term satisfaction rather than being drawn into instant satisfaction. By maintaining their focus on long-term objectives and having a clearly devised plan one can move towards and attain their career goals. I am blessed because my friends have had similar experiences and have similar goals as myself. Sharing thoughts and experiences with them gives me renewed hope and strength, enhancing my chances of achieving success in my academic endeavours.

7. How has your experience doing mathematics in Australia been so far?

In Australia, there are lots of facilities and opportunities for doing mathematics. During my PhD, I received several scholarships for summer and winter schools, involving wonderful lectures by outstanding professors. However, I have noticed that in Australia there are not as many job opportunities in mathematics as there are in other countries, and I hope that this trend will soon change as Australia's economy transitions into one which is more technologically driven. I believe that many companies will benefit from hiring mathematicians as analytical reasoning has proven to be an important factor for ingenuity and progress.

8. What achievements are you most proud of?

I have had many achievements and received numerous certificates during my studies but the one which I am most proud of is winning the prestigious Maryam Mirzakhani Award conferred by the Australian Mathematical Society. I am very proud of winning this award since the late Maryam Mirzakhani was one of my heroines during my high school years. She blossomed in a male-dominated society and is a role model for all women who believe in their abilities and aim to break the glass ceilings of their societies.

An interview with Dr Hoa Bui: 2020 Winner of the AustMS WIMSIG Maryam Mirzakhani Award*

Conducted by Masoud Kamgarpour**



1. When did you first become interested in mathematics?

I did not have a particular interest in mathematics until the 6th grade. This is the first year that students in Vietnam learn how to do a proper mathematical proof like induction, or proof by contradiction. I enjoyed so much that I spent the whole year writing a book, which I called “number theory”, to collect my thoughts and proofs. It was mainly just a collection of my homework. Of course, this book has never been published. Nevertheless, I am very proud of it.

2. Could you tell us about your life and career path so far?

I was born in a small town in middle of Vietnam. I moved to Ho Chi Minh city to study my bachelor’s degree in maths. I have always admired all of my maths teachers and wanted to be a maths teacher myself.

At the end of my Bachelor’s, I attended a spring school organised by the Vietnamese Mathematical Society. At the end, I was really sad when I realised that this was meant to be my last mathematics lecture. I distinctly remember that the last lecture was about Random and Galton-Watson trees and was really enjoyable. After the spring school, I decided to postpone my teaching dream and seek an opportunity for studying PhD in mathematics.

I was lucky that my university lecturers, especially my honours supervisor, were very supportive. They gave me valuable advice regarding studying PhD in Australia.

*The Maryam Mirzakhani Award is a \$3000-dollar top-up scholarship with the aim of supporting international female mathematics postgraduate students in Australia. Each year the award will be made on a competitive basis by a selection committee of distinguished mathematicians, appointed by the executive committee of Australian Mathematical Society’s Women in Mathematics Special Interest Group (WIMSIG). There is one round of the Maryam Mirzakhani Award per year, with the closing date 1 April. For more details, see <https://austms.org.au/awards-grants/awards/maryam-mirzakhani-award/>.

**School of Mathematics and Physics, The University of Queensland.
Email: masoud@uq.edu.au

3. What does your current research involve?

My research involves both theoretical and applied mathematics with a particular focus on variational analysis, optimization and graph theory, and their applications in the real world.

During my PhD at the Federation University, I explored generalisations of convex separation theorem for nonconvex settings and characterised certain irregularity behaviours of the intersections of sets. I have published several papers on this topic. One of my current goals is to apply the theory to practical real world problems. Since most real-world problems are inherently nonconvex, I want to utilize some important optimisation properties of convex functions beyond the convex framework. I have published one paper in this regard and have an on-going project, in which I develop some related computational tools.

During my PhD, I also got involved in a reading group on graphs of polytopes. I was fascinated with the topic and decided to pursue graph theory as my secondary research field. I first studied the connectivity and linkedness of graphs of cubical polytopes and obtained publications in this direction. Currently, I am working on proving certain graph colouring conjectures for polytope graphs.

I enjoy all mathematical topics and continuously try to broaden my research to connect with other more diverse branches of mathematics. I understand and value the importance of publications; however, I place more importance in further developing my knowledge of mathematics and my appreciation of its beauty through discussions and problem solving with my collaborators and students.

After PhD graduation, my passion for mathematics has grown into a more practical direction. Thus, currently I am applying what I have learned during three years of PhD to solve real-world problems. My ultimate goal in the next five years is to answer many of my applied questions and to carry my principle research further.

At the moment, I am working as a postdoc with an operations research group at Curtin University. I am leading a project on scheduling problems for industry companies. It is very fascinating. I had never imagined that my theorems, obtained in a theoretical setting, could be useful in real-world setting. The experience has given me a new perspective on the applications of mathematics.

4. How do you achieve a balance between your work and life?

I enjoy painting and photography and have a goal to sell my paintings at the City Beach Market in Perth. I think the key thing is that we should enjoy everything we are doing. If that is the case, all else will fall into place.

5. Where do you see yourself 10 years from now?

Academically, I want to be a strong independent researcher in a senior academic position. I would like to have some breakthroughs in my field of research, and I am working towards that. In addition, I will keep doing more industrial and other real-world applications. I hope these will have real impact in the world. Of course, I hope to still enjoy what I am doing.

6. What advice would you offer to young women who are just starting their careers in the mathematical sciences?

“Be yourself” is the only advice I can offer at the moment. It is, for me, a very strong statement. I wasn’t a person who follows the standard norms and I have never minded that. I am very lucky to have my parents’ encouragement and my teachers full support. Many of my female friends have not been that fortunate. They have followed the mindsets (or standard norms) of other people, which has occasionally meant giving up on their dreams.

7. How has your experience doing mathematics in Australia been so far?

Doing mathematics is fun regardless of where you are. Specifically, in Australia, having my supervisors and other researchers to discuss maths brings me great joy. I like the friendly environment where I can call professors by their first name. I feel like there is no distance between students and faculty members. I find this approachable environment helpful for learning and collaborations.

Meeting the Parliament: a mathematician's experience

Masoud Kamgarpour*

Having participated in the 2019 “Science Meets Parliament” as a delegate of the Australian Mathematical Society, I felt compelled to share my experience with fellow mathematicians in a timely manner. The health crises, however, gave rise to different priorities, deferring the task to the meditative respite in between the chaos of online semesters. Naturally, this is not a detailed report of all activities (long forgotten and in any case not of wide interest), but rather of those impressions which have stood the test of time. The brief verdict is that while a large part of the two-day event is rather dull, there is plenty to make it worthwhile, especially if the \$1100 (!) registration fee is generously covered by a sponsor.

The first day was essentially a workshop on how to perfect one's “pitch” to the Members of the Parliament. Evidently, the organisers assumed that most scientists were interested in getting funding for their projects. Accordingly, much of the discussions centred around monetary aspects, a turn-off for the non-business minded folks (which were aplenty). I do recall an entertaining recommendation about how *not* to pitch to politicians. “If you are a Vice-Chancellor of a major university pleading poor to a Minister” said an advisor, “the brand new two hundred-million-dollar campus building is perhaps not the best setting”. In the breaks, over excellent coffee and snacks, I met a remarkable array of scientists from all over Australia doing amazing work; among them was a geologist exploring the deepest parts of the Pacific Ocean, a data security expert defending against the latest tricks of the hackers, a researcher at the Australian Nuclear Science and Technology Organisation giving us a virtual tour of a reactor, a postdoc explaining how crabs help with moderating ocean temperatures, another postdoc peddling algae as the solution to all world's problems, and, most memorably and informatively, BOM and CSIRO scientists teaching us an enormous amount about what climate change actually means. The first day was concluded by a rather tasteless dinner in the Parliament House whose highlight was a heartfelt story by the Science Minister about her experience in artificial impregnation of cows.

During the second day, we were given a tour of the Parliament House and attended a live session of Parliament's *Question Time*. The parliamentary debate appeared more like a quarrel between old couples than a great democratic exercise. We were, however, forewarned that much of the posturing is for the media and that most of the good work happens behind the scenes with significant agreement between

major parties. Parliamentary gymnastics created havoc for the scheduled meetings between scientists and MPs, leading to several hours of wait in a crammed room full of scientists nervous about their meetings with the political class. (Oh, how

*School of Mathematics and Physics, The University of Queensland
Email: masoud@uq.edu.au

one misses those pre-Covid crammed rooms!) In the last possible moment, I was whisked away to the office of the Canberra MP, Andrew Leigh. Under normal circumstances, we would have a day to research “our” MP, read their speeches, and determine points of common interest. As it was, I only had the five-minute walk to the MP’s office to read his Wikipedia entry. The achievements were impressive indeed: PhD in public policy from Harvard, Professor of Economics at the ANU, and writer of more than 50 scientific articles, 100 opinion pieces in leading papers, and 8 books on diverse topics from economics for the layman to the sober analysis of disconnection and loneliness in the Australian life. Any worries about how to break the ice vanished as soon I entered his office where I was greeted by a life-size poster of a former American president. Why, in the early days of 2008, when scarcely anyone outside Illinois had heard of his name, I was part of a group of students canvassing the streets of Iowa reminding people to vote for a certain Barack Obama in that fateful first Democratic Caucus.



Masoud Kamgarpour (left), Andrew Leigh (middle)

Prior to attending Science Meets Parliament, I had consulted some senior members of the AustMS about the issues that deserve highlighting, eventually settling on two broad themes: emphasising the role of basic mathematical research in a modern society and discussing the critical state of mathematics education in Australia. As it turned out, the MP I met was formidably well-informed about the matters, quickly making me realise that I need to study the issues more carefully before further discussions. Much too soon, the Parliament bell rang and he had to run off for the next vote. I was intrigued by the sincerity, dignity, and intellect of Andrew Leigh. Over the past few months, I have read some of his articles and book excerpts, and have watched some of his interviews and talk, including a recent Zoom talk for mathematicians discussing the rapid growth of aboriginal incarceration rates. I have come to believe that Andrew Leigh represents the best of the Australian Creed and sincerely hope that he runs for the highest office.

The most positive aspect of Science Meets Parliament was the convergence of so many scientists working on diverse fields discussing their ideas and research with each other. In my 20 years of university life, this was the first such experience and it was a wonderful one indeed. The event would be further enhanced if social scientists are also included in the midst. As the Covid Crisis has demonstrated, meeting today's enormous challenges requires the input of not only natural scientists, but also economists, sociologists, psychologists, anthropologists, and political scientists. Including more diverse thinkers and guiding them towards a purpose higher than mere monetary extraction, could turn events such as Science Meets Parliament into a fertile ground for new ideas and innovations.



MATRIX News

Tom Keegan*

ANU joins MATRIX Partnership

MATRIX is delighted to announce that the Australian National University (ANU) has joined Monash University and The University of Melbourne in a three-way partnership.

Access the news release at <https://www.matrix-inst.org.au/news/>.

Call for Research Programs

Anyone can apply to organise a MATRIX research program. Every research program should have ample unstructured time to encourage collaborative research. Longer programs can have an embedded conference or lecture series. Short workshops focusing on a special theme are also welcome. The MATRIX Family Fund provides additional support to participants with families.

The MATRIX Scientific Committee selects programs on scientific excellence as well as on the participation rate of high-profile international participants and/or business and industry partners, among other criteria.

The next deadline for research program proposals in 2022-2023 is **Friday, 6 November 2020**. Expressions of interest may be submitted at any time. Guidelines can be found at <https://www.matrix-inst.org.au/guidelines>.

Research Program Organisers are encouraged to supplement their funding from MATRIX through other schemes including the: International Visitor Program of the University of Sydney Mathematical Research Institute; AMSI and AustMS/ ANZIAM workshop funding scheme; and AustMS travel grants.

<https://www.matrix-inst.org.au/funding-opportunities/>

Inaugural Research Program Online

MATRIX hosted its first online research program on 11–12 August 2020.

- **Operad Pop-Up** <https://www.matrix-inst.org.au/events/operad-pop-up/>
Organisers: Philip Hackney (University of Louisiana, Lafayette), Geoffroy Horel (Paris 13/Ecole Normale) and Marcy Robertson (University of Melbourne).

Online Seminar Series

MATRIX hosts a series of monthly online seminars. You are invited to join us.

*MATRIX, Creswick, <http://www.matrix-inst.org.au/>

Our upcoming seminar speakers include:

- Akshay Venkatesh, Institute of Advanced Study (October)
- Peter Bühlmann, ETH Zürich (November)
- Javier Tordable, Office of the CTO, Google Cloud (December)

For information on future seminars and access to recordings of past seminars, visit <https://www.matrix-inst.org.au/events-01/online-seminars/>.

MATRIX is pleased to have already hosted the following online seminars in 2020:

- Miranda Cheng, University of Amsterdam
Modular Forms and Applications
- Geordie Williamson, Sydney Mathematical Research Institute (SMRI)/
University of Sydney
Modular Representation Theory and Geometry
- Michael I. Jordan, University of California Berkeley (UCB)
Optimization with Momentum
- Maria Chudnovsky, Princeton University
Holes with Hats and the Erdős-Hajnal conjecture
- James McCaw, University of Melbourne
Mathematical Modelling of Infectious Diseases
- Terry Tao, University of California Los Angeles (UCLA)
The Collatz Conjecture

Further Information

Comments, suggestions and requests are always welcome. Please send these, as appropriate, to:

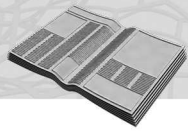
Director:	Jan de Gier (jdg@matrix-inst.org.au)
Deputy Directors:	David Wood (davidw@matrix-inst.org.au) Peter Bouwknegt (peterb@matrix-inst.org.au)
Executive Officer:	Tom Keegan (tomk@matrix-inst.org.au)
Chair of the Advisory Board:	Tony Guttman (guttman@unimelb.edu.au)

Website: <https://www.matrix-inst.org.au>

Twitter: https://twitter.com/MATRIX_Inst



Tom Keegan commenced as the Executive Officer of MATRIX in January 2020. He came to the role with 15 years of research and graduate research management in the university sector in Victoria. Tom provides expertise in managing high-level strategic initiatives, resources and operational planning for MATRIX. He is a member of the Australasian Research Management Society (ARMS) and former member of the ARMS Victoria-Tasmania Chapter Executive.
<https://www.linkedin.com/in/tomkeegan2/>



SMRI News

The Sydney Mathematical Research Institute

Anthony Henderson*

Making predictions in 2020 is a tricky business. In my last column I reported on the new SMRI scheme for domestic visitors, which we introduced once it became clear that the resumption of our International Visitor Program was at least a semester away. Our Dean of Science was kind enough to categorize this as a “pivot”. Now, having pivoted to the Domestic Visitor Program, I am announcing the successful applicants at a time (early August) when even interstate travel is impossible. Like all Australians, I hope that the present restrictions will work swiftly and that we will see state borders reopening over the course of the semester, so that most of these planned research visits to SMRI will go ahead on roughly the intended dates. If that hope has been fulfilled by the time that you are reading this, then please keep an eye out for more calls for applications for domestic visitors. If not, expect further pivots!

The SMRI staff continue to add more content to our YouTube channel, including recordings of the online seminars we run and Zoom interviews with researchers who have visited or will visit us. A recent highlight in the latter category is the interview with Nancy Scherich entitled “Mathematics and Dance”. For all the links and the latest information please visit our website <https://mathematical-research-institute.sydney.edu.au>.

Domestic Visitor Program – July 2020 round Successful Applicants¹

James Borger (Australian National University)

Research interests: Algebra, number theory, algebraic geometry

Dates: 7 September – 18 September 2020

Lance Gurney (Australian National University)

Research interests: Prismatic cohomology, shtukas, Dieudonné theory, CM elliptic curves, Drinfeld modules, Lubin-Tate modules, Coleman functions, explicit class field theory, Witt vectors

Dates: 7 September – 18 September 2020

Anthony Licata (Australian National University)

Research interests: Representation theory, quantum topology, categorification, geometric group theory

Dates: 7 September – 20 September 2020

Host: Oded Yacobi

*Sydney Mathematical Research Institute, University of Sydney.

Email: anthony.henderson@sydney.edu.au

¹Dates are as of 10 August 2020 and are subject to change. For up-to-date information see the SMRI website.

Yury Stepanyants (University of Southern Queensland)

Research interests: Theory of nonlinear oscillations and waves, physical oceanography, vortices in fluids and in geophysical fluid dynamics, theoretical and computational fluid mechanics, instability of shear flows

Dates: 16 September – 6 October 2020

Murray Elder (University of Technology Sydney)

Research interests: Geometric group theory, complexity theory, automata and formal language theory, enumerative combinatorics, pattern-avoiding permutations

Dates: 28 September – 12 October 2020

Adam Piggott (University of Queensland)

Research interests: Combinatorial and geometric group theory

Dates: 28 September – 12 October 2020

Peter McNamara (University of Melbourne)

Research interests: Representation theory, number theory, algebraic combinatorics

Dates: 6 October – 9 October, 23 November – 4 December 2020

Host: Oded Yacobi

Mumtaz Hussain (La Trobe University)

Research interests: Analytical number theory, ergodic theory, dynamical systems

Dates: 2 November – 4 December 2020

Hosts: Dzmityr Badziahin and Alexander Fish

Bronwyn Hajek (University of South Australia)

Research interests: Analytical solution of evolution equations, reaction-diffusion equations

Dates: 9 November – 20 November 2020

Host: Robert Marangell

Kari Vilonen (University of Melbourne)

Research interests: Geometric representation theory

Dates: 9 November – 20 November 2020

Host: Anthony Henderson

Ting Xue (University of Melbourne)

Research interests: Geometric aspects of representation theory, algebraic groups, algebraic geometry

Dates: 9 November – 20 November 2020

Host: Anthony Henderson

David Robertson (University of New England)

Research interests: Combinatorial models for C^* -algebras

Dates: 9 November – 22 November 2020

Host: Nathan Brownlowe

Theodore Vo (Monash University)

Research interests: Origins and properties of rhythms in neural and cardiac systems

Dates: 9 November – 3 December 2020

Host: Martin Wechselberger

Aidan Sims (University of Wollongong)

Research interests: Operator algebras and their applications, especially C^* -algebras associated to dynamics

Dates: 16 November – 27 November 2020

Host: Nathan Brownlowe

Marcy Robertson (University of Melbourne)

Research interests: Operad theory, homotopy theory, higher category theory

Dates: 16 November – 28 November 2020

Host: Zsuzsanna Dancso

Ivan Guo (Monash University)

Research interests: Financial mathematics, stochastic control, optimal transport, model calibration, robust finance, stochastic games, graph theory, machine learning

Dates: 16 November – 4 December 2020

Host: Anna Aksamit

Mehdi Tavakol (University of Melbourne)

Research interests: Moduli spaces of curves, algebraic cycles, motives, triangulated categories, Calabi-Yau manifolds, Landau-Ginzburg theory, Higgs bundles, Frobenius manifolds

Dates: 16 November – 4 December 2020

Jie Yen Fan (Monash University)

Research interests: Probability theory and stochastic analysis

Dates: 30 November – 18 December 2020

Host: Benjamin Goldys

Ngan Le (Monash University)

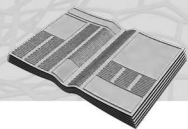
Research interests: Dynamics in nano-magnetics, anomalous sub-diffusion problems and porous media problems

Dates: 1 December – 15 December 2020

Host: Benjamin Goldys



Anthony Henderson is currently the Executive Director of the University of Sydney Mathematical Research Institute, which he helped to establish in 2018. After obtaining his PhD from the Massachusetts Institute of Technology in 2001, he returned to the University of Sydney as a postdoctoral researcher and has worked there ever since. For his publications in geometric and combinatorial aspects of representation theory, Anthony was awarded the Christopher Heyde Medal in 2011 and the Australian Mathematical Society Medal in 2012. He also received a Faculty of Science Citation for Excellence in Teaching in 2009, and his Honours-level lecture notes on Lie algebras were published by Cambridge University Press in 2012. He is a founding Director of the Simon Marais Mathematics Competition for undergraduates in the Asia-Pacific region.



News

General News

Australian National University

Asha Rao from RMIT University has been appointed Interim Director of the Australian Mathematical Sciences Institute (ASMI), commencing from 18th August 2020.

UNSW Sydney

UNSW Sydney is now offering Honours in Quantitative Data Science program. The program focuses on high level data science, involving coursework with a thesis component.

Maths Art/Poster Competition

The dates for CARMA's first annual 'Universities online Maths Art/Poster Competition' have been extended. Entries now close 13 November, with online celebration and announcements 7 December (the day before AustMS starts): <https://carma.newcastle.edu.au/art/gallery/competition>. The organisers have received lots of entries in the 'Maths Art' category, which is wonderful, but only a few handfuls of entries in the 'Maths Research Posters' category and 'Maths Outreach Posters' category. So, to make it a great competition, please think if you would like to submit an entry in any of the categories, or if there is someone you know who might enjoy participating whom you could pass this information along to. We especially encourage research students to try their hands at research posters — it is a great skill to develop!

Completed PhDs

Australian National University

- Dr Abhishek Bhardwaj, *Polynomials, non-negative sums of squares & the moment problem*, supervisors: Martin Helmer, Anand Deopurkar, Igor Klep and Ian Turner
- Dr Ziyang Lyu, *Asymptotic theory for linear mixed effects models with large cluster size*, supervisors: Alan Welsh, Steven Roberts, Robert Clark, Samuel Muller and Francis Hui

La Trobe University

- Dr Ahmed Mohammed Alamer, *Lightweight synchronous stream ciphers: from mathematical and statistical analysis to proposed secure protocols for mobile cloud computing and RFID applications*, supervisors: Ben Soh and Andriy Olenko

Swinburne University of Technology

- Dr David Ostler, *Efficient and nonintrusive electropumping of water in nanotubes*, supervisors: Billy Todd, Federico Frascoli and Peter Daivis

University of Melbourne

- Dr William Moore, *Biorthogonal polynomial sequences and the asymmetric simple exclusion process*, supervisor: Richard Brak

University of Southern Queensland

- Dr Mohanad Shakir Khalid Al-Musaylh, *Development of data intelligent models for electricity demand forecasting: case studies in the state of Queensland, Australia*, supervisors: Ravinesh Deo, Yan Li and Jan Adamowski (McGill University Canada). This PhD was awarded with Excellence in Doctoral Research.

University of Sydney

- Dr Bernard Ikhimwin, *A computational model of initial lymphatics/pre-collectors and valvogenesis*, supervisors: Mary Myerscough and Chris Bertram
- Dr Kristen Emery, *Controlling the FDR through multiple competition*, supervisor: Uri Keich

University of Western Australia

- Dr Michael Bertolacci, *Hierarchical Bayesian mixture models for spatiotemporal data with nonstandard features*, supervisors: Edward Cripps, John Lau and Melinda Hodkiewicz

Awards and other achievements

Australian National University

- Dr Po-Lam Yung is a recent recipient of an ARC Future Fellowship.

RMIT University

- Professor Asha Rao is Chief Investigator (with A. Bab-Hadiashar) on a \$1.5M 2019–2022 Category 2 grant: Maritime Platform Dynamics and Control, DST Group Submarine Dynamics and Control, Defence Science and Technology Group. She is also recipient of the 2019 RMIT Award for Research Impact (Enterprise).

University of Melbourne

- Dr Michael Wheeler and Dr David Ridout are recent recipients of ARC Future Fellowships.

University of New England

- Professor Yihong Du gave a plenary talk on ‘Propagation, diffusion and free boundaries’ at the Eighth Pacific Rim Conference in Mathematics (<https://wp.math.berkeley.edu/pacificrim2020>), hosted by U.C. Berkeley (online) 3–7 August 2020.

University of Southern Queensland

- A/Prof Ravinesh Deo (with PhD Student Ekta Sharma) received a \$26,000 grant from Defence, Science and Technology Group (DSTG) under Australian Mathematical Science Institute Internship (‘Efficient Algorithms for AI-enabled Communication’). The project will collaborate with CDS Fellow Dr Ismail Shakeel (DSTG) to build an AI-enabled communication system possessing the capability to sense and learn the operating environments and autonomously generate robust waveforms for reliable and uninterrupted communication. It will develop efficient artificial intelligence (AI) and machine learning (ML) algorithms for intelligent communication systems into the future.

University of Sydney

- Nalini Joshi was awarded a Rothschild Fellowship at the Isaac Newton Institute to participate in a program planned for the first half of 2021.
- A/Prof Peter Kim is a recent recipient of an ARC Future Fellowship.

University of Western Australia

- Ed Cripps is the Chief Investigator and UWA Data Science Lead on the ARC Industrial Transformation Research Hub for Transforming Energy Industry through Digital Engineers (2021–2025), with Director Phil Watson.

UNSW Sydney

- Dr Shane Keating has won a Universitas 21 Global Education Fund award to develop online teaching resources in ocean, weather, and climate science.
 - Professor Chris Tisdell is a member of a team on a bid, led through the University of Adelaide, that has been awarded funding of \$9.5 million by the Australian Government to develop online teaching and learning resources for mathematics and numeracy. The grant will fund the delivery of a series of Massive Open Online Courses (MOOCs), and other online mathematics and numeracy resources, for foundation to Year 10 maths teachers.
 - Dr Clara Grazian was awarded a Defence Innovation Network Scheme (DIN) pilot project ‘Optimising ADF military working dog performance through next-generation monitoring systems’ totalling \$175,000.
-

Appointments, departures and promotions

Australian National University

- Noah White has commenced as an MSI JISC Fellow.
- Sean Gomes has commenced as a Postdoctoral Fellow.
- Lance Gurney has commenced as a Postdoctoral Fellow.
- Simon Kitson has departed.

Curtin University

- Dr Fabrizio Padula left the School of Electrical Engineering Computing and Mathematical Sciences, Curtin University for a continuing lecturer position in the School of Civil and Mechanical Engineering, Curtin University.

Federation University

- Dr Ning Ruan completed her term as Senior Research Fellow.

Flinders University

- Dr Murk Bottema retired from his position at Flinders University in May 2020. He was on the staff of the Mathematics discipline for 27 years.

La Trobe University

- Prof Birgit Loch, Professor of Mathematics Education and Deputy Provost Learning and Teaching in the College of Science, Health and Engineering, has been appointed to the College Provost.
- Prof Reinout Quispel awarded a title of Emeritus Professor of La Trobe University. He retired from the University in July 2020.

RMIT University

- Dr Sona Taheri joined RMIT Mathematical Sciences Discipline as a lecturer on 1 July 2020. She came from Federation University Australia where she received her PhD in Information Technology in 2012 and subsequently worked as a research fellow since. Her research interests are in the area of optimization, particularly nonsmooth, nonconvex and DC optimization; data mining and machine learning, in particular cluster analysis and regression in large data sets; and cyber security, mainly in alert analysis and malicious multi-source data sets.
- Dr Sharmila Kayastha started as a Postdoctoral Fellow in February 2020, on the DST Funded project, Maritime Platform Dynamics and Control.

University of New England

- Dr Benniao Li completed his postdoctoral fellowship at UNE in August 2020. He has moved to Jianxi Normal University, China for a regular academic position.

UNSW Sydney

- Dr Arnaud Brothier, Dr Pavel Krivitsky, Dr Libo Li, Dr Anita Liebenau and Dr Mircea Voineagu were promoted to Senior Lecturer.

New Books

University of Southern Queensland

Deo, R.C., Kisi, O., Samui, P. and Yaseen, Z.M. (eds) (2020). *Intelligent Data Analytics for Decision-Support Systems in Hazard Mitigation: Theory and Practice* (Springer Transactions in Civil and Environmental Engineering) Springer, Singapore, 469 pp.

<https://www.springer.com/gp/book/9789811557712>

Deo, R.C., Samui, P. and Roy, S.S. (eds) (2020). *Predictive Modelling for Energy Management and Power Systems Engineering*. Elsevier, New York.

Conferences and Courses

Conferences and courses are listed in order of the first day. In view of the disruption caused by CoViD-19, you should check the links given, or directly with the organisers, for updates.

For an update about MATRIX programs, see the report by Tom Keegan in this issue. Note also that MATRIX now have an online seminar series:

<https://www.matrix-inst.org.au/>.

2nd International Conference on Mathematics, Science and Technology Teaching and Learning (ICMSTTL 2020)

Dates: 28–30 October 2020

Venue: now ONLINE

Web: <http://www.msttl.org/index.html>

Conference General Chairs: Prof Chris Tisdell, University of New South Wales, and Prof William W. Guo, Central Queensland University

ICMSTTL aims to bring together tertiary educators, researchers and students, primary and secondary school teachers, education administrators and policy makers from all over the globe to discuss theoretical, technological, practical, pedagogical, social, cultural, economic, and managerial issues in all relevant areas of mathematics, science and technology teaching and learning in the digital age. It is a timely interdisciplinary forum for all participants to share and/or appreciate the recent innovations, trends, challenges, and possible solutions in mathematics, statistics,

computer science, information and communication technology, and other physical sciences.

Fully refereed papers will be published in ACM conference proceedings indexed by EI Compendex and Scopus. As a sponsor for this conference, MDPI Mathematics (an OS journal with Impact Factor 1.747) is dedicating a special issue ‘Mathematics Education in Science, Technology and Engineering: Exploring Research and Scholarship of the Student and Staff Experience’ for this event. As this is a relatively independent special issue, authors can submit manuscripts directly to MDPI Mathematics by 30 November 2020 through https://www.mdpi.com/journal/mathematics/special_issues/Mathematics_Education_Science_Technology_Engineering. AustMS members may arrange for a discounted APC rate if their manuscript is accepted by this special issue.

Maple Conference 2020

Dates: 2–6 November 2020

Venue: Online

Web: <https://www.maplesoft.com/mapleconference>

This year’s conference is happening online, and is dedicated to exploring different aspects of the math software Maple, including Maple’s impact on education, new symbolic computation algorithms and techniques, and the wide range of Maple applications. Attendees will have the opportunity to learn about the latest research, share experiences, and interact with Maple developers. The conference will include live presentations and discussions as well as recordings and chatrooms, in order to accommodate different time zones. Maplesoft staff will also offer Maple training sessions on a variety of topics during the conference.

For further details, including registration and eventual publication, please see the website.

The 15th Australasian Conference on Mathematics and Computers in Sport

Tentative dates: 9–11 November 2020

Venue: Virtual event hosted by Victoria University Wellington

Web: <https://www.anziam.org.au/The+15th+Australasian+Conference+on+Mathematics+and+Computers+in+Sport>

The ANZIAM Mathsport 2020 meeting has been changed from a live meeting in May to an online meeting in November for the health and safety of our members and in response to travel and funding restrictions imposed by the corona-virus pandemic. The Abstracts Book, Program and many other details are available from the website. Speaker Zoom recoding information and a draft schedule for the online meeting are also available from the website.

International Conference on Applications and Techniques in Information Security (ATIS2020)

Dates: 12–13 November 2020

Venue: now ONLINE

Web: <http://www.atis2020.conferences.academy/>

The conference will be virtual because of flight restrictions

The 2020 International Conference on Applications and Technologies in Information Security (ATIS), will be the eleventh (11th) event in the ATIS series, which started in 2010. The purpose of ATIS is to provide a forum for presentation and discussion of innovative ideas, research results, applications and experience from around the world. The annual ATIS conference highlights new results in the design and analysis of digital security hardware and software implementations. ATIS provides a valuable connection between the theoretical and implementation communities and attracts participants from industry, academia, and government organisations.

As academic research in information security has developed over the last twenty or so years, applications and techniques are being developed to be of specific use in this area. These include wavelets and their applications in digital forensics, classification algorithms for use in malicious software detection, and genetic algorithms custom-made for the cryptographic community, etc. ATIS 2020 focuses on all aspects on techniques and applications in information security.

Workshop on Optimisation, Metric Bounds, Approximation and Transversality (WOMBAT 2020)

Dates: 30 November to 4 December 2020

Venue: now ONLINE

Web: <https://wombat.mocao.org/>

The fifth Workshop on Optimisation, Metric Bounds, Approximation and Transversality has been converted into online mode, and will be now held from 30 November to 4 December 2020. The workshop is dedicated to the memory of Professor Alex Rubinov and will include a memorial session, keynote as well as contributed lectures and a number of discussion sessions in an online format.

Bioinfo Summer 2020

Dates: 30 November to 4 December 2020

Venue: Virtual event hosted by the Australian National University

Web: <https://amsi.org.au/events/event/amsi-bioinfosummer-2020/>

In 2020, AMSI BioInfoSummer is going virtual! Develop your bioinformatics skills, national networks and employability. Please see the website for further updates.

Eighth Annual Workshop on Integrable Systems

Dates: 3–4 December 2020

Venue: University of Sydney

Web: <http://wp.maths.usyd.edu.au/igs/workshops/integrable-systems-2020/>

COVID-19 advisory: we are considering our options around this workshop in light of the global situation. Please wait for confirmation before making any travel or accommodation bookings.

Register by emailing the organisers at: integrable@maths.usyd.edu.au. Registrations close on 1 November 2020.

64th Annual Meeting of the Australian Mathematical Society

Dates: Tuesday 8 December 2020 to Friday 11 December 2020

Venue: Virtual event hosted by the University of New England

Web: <https://www.austms.org.au/tiki-calendar.php?calitemId=901>

Registration will be available on the AustMS website soon. Further information: Gerd Schmalz schmalz@une.edu.au

AMSI Summer School 2021

Dates: 11 January to 5 February 2021 (note change)

Venue: Virtual event hosted by the University of Adelaide

Web: <https://ss.amsi.org.au/>

The AMSI Summer School 2021 program offers eight carefully selected subjects to ensure the latest developments in Australian maths are offered to students, some of which may not be offered at a home university. Students can choose to study one or two courses and, with permission from a home university, students can use an AMSI Summer School subject to gain credit towards their degree.

The School is primarily for honours and postgraduate students in the mathematical sciences and cognate disciplines, but other students are welcome to apply.

Computational & Algorithmic Topology, Sydney (CATS 2020)

Dates: 26–30 July 2021

Venue: The University of Sydney

Web: <https://sites.google.com/view/cats-2020>

The meeting has been postponed to next year (2021). The dates have changed but everything else stays the same.

WIMSIG (Women in Mathematics Special Interest Group) 2020

Dates: 29 September to 1 October 2021

Venue: Monash University

Web: <https://www.austms.org.au/WIMSIG-conference-2020>

The WIMSIG Conference has been postponed by exactly one year; please update your calendars.

The Mathematics of Conformal Field Theory II (POSTPONED)

Dates: sometime in 2021 (postponed from July 2020)

Venue: Australian National University

Web: <https://maths.anu.edu.au/news-events/events/mathematics-conformal-field-theory-ii>

This event has been postponed due to COVID-19. It will take place in 2021: dates to be confirmed.

The recent drive in theoretical physics to unify gravity with the other fundamental forces has led to an explosion of activity at the interface between mathematics and physics, and conformal field theory has proven to be a particularly active and exciting example of this interaction. While conformal field theory was initially developed for physical purposes, it has also inspired breakthroughs in diverse mathematical fields such as number theory, combinatorics, differential and algebraic geometry, sporadic finite groups, quantum groups, knot theory, and more. This conference will engage the various mathematics and mathematical physics communities who study CFT to discuss recent breakthroughs and develop new directions for future research. On the mathematical side, subjects will include vertex algebras, conformal nets, subfactors, and higher categories, while on the physical side topics will include gauged quantum field theories, generalised moonshine, topological defects/interfaces and statistical lattice models.

Aboriginal and Torres Strait Islander Mathematics Alliance 2020 Conference (POSTPONED)

Dates: sometime in 2021 (postponed from July 2020)

Venue: Yirrkala, Northeast Arnhem Land

Web: <https://atsimanational.ning.com/conference-2020-postponement>

Contact: Melinda Pearson, 0414 322 372 or melindapearson@atsima.org

Due to the global pandemic caused by the new coronavirus disease (COVID-19) ATSIMA has received official notification from the Yirrkala Community Action Group that there will be no events held in Yirrkala Community until further notice. This means the ATSIMA 2020 conference has been postponed, the conference committee is anticipating the conference will be rescheduled for 2021. If you would like to be kept in the loop with further updates email as above. If you registered for ATSIMA 2020 you do not need to leave your details as you will be updated automatically.

Please contact Melinda Pearson as above if you would like to discuss any details regarding refunds of registration or future plans for ATSIMA Conference.

Mathematica Solis et Terrae

Dates: 2–3 December 2021 (rescheduled)

Venue: Australian National University, Canberra

Web: <https://maths.anu.edu.au/news-events/events/math%C4%93matica-s%C5%8Dlis-et-terrae-australian-academy-science-elizabeth-and-frederick>

This event was originally scheduled in the MSI Special Year 2020–Mathematical Physics calendar but has been rescheduled to 2021 due to COVID-19.

The rapid progress and expansion of computational power will soon reach the exascale, and provide the compute to solve a new class of problems. The enabling science of high-performance computing is computational mathematics: permitting solution to high dimensional problems, improve the efficiency of calculation, and robustly quantify uncertainty.

Mathematica Solis et Terrae is a two-day research conference. It will bring together a diverse group of disciplines to share challenges and explore synergies in high performance computing simulation in the fields of the solid Earth (geophysics), land-atmosphere carbon exchange (earth systems science), and solar physics.

The conference will cover topics in numerical analysis (e.g. Galerkin methods, spline-based techniques, sparse-grids, uncertainty quantification and matching layers) and applications in geophysics, Earth system science and solar and astrophysics.

Abstract submissions for contributed talks and student posters will open soon.

The 43rd Australasian Combinatorics Conference (43ACC)

Dates: ?? December 2021

Venue: The University of Melbourne

Web: <http://43acc.ms.unimelb.edu.au>

POSTPONED from 14–18 December 2020

After a careful assessment of the potential impact of the COVID-19 pandemic to this conference and following a suggestion of the CMSA Council, we have decided to postpone 43ACC to December 2021. At this stage we are unable to confirm exact dates, but it is likely that 43ACC will be postponed until early or middle December 2021. (The AustMS annual meeting usually takes place in December, and we will try to avoid clash with 2021 AustMS meeting.) Once finalised, the exact dates will be published on the website.

International Congress of Mathematicians

Dates: 6–14 July 2022

Venue: Saint Petersburg, Russia

Web: <https://icm2022.org>

The local organizers have issued the first ICM Newsletter, which can be retrieved from <https://yastatic.net/s3/contest/icm2022/icm%20newsletter.pdf>. If you have any feedback regarding the ICM Newsletter, please email feedback@icm2022.org.

Please do sign up directly for future newsletters via <https://icm2022.org> (scroll to the bottom of the page for the sign-up field). We hope to see many of you at the ICM in 2022 in Saint Petersburg!

Visiting mathematicians

International visitors who arrived before the border closures are listed here. Their details are presented in the format: name of visitor; home institution; dates of visit; principal field of interest; principal host institution; contact for enquiries.

For the Domestic Visitor Program at the Sydney Mathematical Research Institute, see the article by Anthony Henderson in this issue.

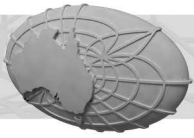
Miaomiao Cai; Dalian University of Technology; September 2019 to September 2020; UWA; Enrico Valdinoci and Serena Dipierro

Teresa Dias; Federal University of Sao Carlos; March 2020 to February 2021; UWA; Adriano Polpo

A/Prof Kreangkri Ratchagit; Maejo University, Chiang Mai, Thailand; 1 March 2020 to 28 February 2021; difference equations and systems theory; CUT

Dr Gen Sakurai; Institute for Agro-Environmental Sciences, National Agricultural and Food Research Organization, Japan; December 2019 to December 2020; mathematical modelling of plant physiology; USA; Stanley J. Miklavcic

Hui Zhang; Jinling Institute of Technology; 14 October 2019 to 15 October 2020; UWA; Enrico Valdinoci and Serena Dipierro



64th Annual Meeting of the Australian Mathematical Society

Dates: Tuesday 8 December to Thursday 10 December 2020

Venue: ONLINE

Enquiries: please contact Gerd Schmalz (schmalz@une.edu.au)

The Society's Annual General Meeting

The Society's 64th Annual General Meeting will be held on Thursday 10 December at 5 pm AEST, via Zoom, during the Society's online annual conference. The agenda, papers, and zoom link for the meeting, will be posted on the conference website about a week before the meeting.

Lift-off Fellowships

Members are reminded of the Society's Lift-off Fellowships which provide short-term support, including living expenses and travel grants, for students who have recently submitted for examination a PhD thesis in the mathematical sciences.

The fellowship rules, application form and details of past fellowship holders can be found at <https://austms.org.au/awards-grants/awards/lift-off-fellowships/lift-off-fellowships-information/>.

If you will soon complete a PhD, or have a student who will soon complete a PhD, please keep the scheme in mind.

AustMS Accreditation

The following member has been accredited a Fellow (FAustMS):

- Associate Professor David Harvey of the University of New South Wales.

The following member has been accredited a Member (MAustMS):

- Dr Nicholas C. Surawski of the University of Technology Sydney.

Deborah Jackson AustMS Secretary

Email: Secretary@AustMS.org.au



Deborah Jackson (née Trueman) is a lecturer at La Trobe University. She began her academic career at Monash University and then moved to Swinburne University. After several years back at Monash, she joined La Trobe in 2010. Deborah was honorary Chair of the Victorian Algebra Group from 1996 to 2003 and its Secretary from 1994 to 1995. Deborah took over as Secretary of the Society in September 2019.

The Australian Mathematical Society

President:	Prof Jacqui Ramagge, FAustMS MAICD	School of Mathematics and Statistics The University of Sydney NSW 2006, Australia. jacqui.ramagge@sydney.edu.au
Secretary:	Dr D.C. Jackson	School of Engineering and Mathematical Sciences La Trobe University Bundoora, VIC 3086, Australia. d.jackson@latrobe.edu.au
Treasurer:	Prof Lilia Ferrario	Mathematical Sciences Institute Australian National University Canberra, ACT 0200, Australia. lilia.ferrario@anu.edu.au
Business Manager:	Ms May Truong	Department of Mathematics Building #145, Science Road Australian National University Acton, ACT 2601, 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:	C. Cousins	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.:	W. Guo	Univ. Canberra:	J. Ascione
Charles Darwin Univ.:	K. Khan	Univ. Melbourne:	B. Xia
Charles Sturt Univ.:	P. Charlton	Univ. Newcastle:	J. Turner
CSIRO:	R.S. Anderssen	Univ. New England:	B. Bleile
Curtin Univ.:	H. Bui	Univ. Queensland:	H.B. Thompson
Deakin Univ.:	L. Batten	Univ. South Australia:	Y. Kaya
Edith Cowan Univ.:	U. Mueller	Univ. Southern Queensland:	T. Langlands
Federation Univ.:	D. Yost	Univ. Sunshine Coast:	P. Dunn
Flinders Univ.:	R.S. Booth	Univ. Sydney:	P. Kim
Griffith Univ.:	B. Johnston	Univ. Tasmania:	B. Gardner
James Cook Univ.:	S. Belward	Univ. Technology Sydney:	S. Woodcock
La Trobe Univ.:	N. Kosytsina	Univ. Western Australia:	G. Wade
Macquarie Univ.:	A. Sikora	Univ. Wollongong:	G. Wheeler.
Monash Univ.:	A. Haley, G. Farr	UNSW Canberra:	T. Trudgian
Murdoch Univ.:	M. Lukas	UNSW Sydney:	V. Roshchina
Queensland Univ. Techn.:	P. Buenzli	Victoria Univ.:	A. Sofo
MIT Univ.:	Y. Ding	Western Sydney Univ.:	J. East

Publications

The Journal of the Australian Mathematical Society

Editor: Professor Jon Berrick
Sydney Mathematical Research Institute (SMRI)
The University of Sydney, NSW 2006, 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

Editor: Professor John Loxton
Western Sydney University, Penrith, NSW 2751, Australia

The *Bulletin of the Australian Mathematical Society* aims at quick publication of original research in all branches of mathematics. Two volumes of three numbers are published annually.

The Australian Mathematical Society Lecture Series

Editor: Professor Jacqui Ramagge
School of Mathematics and Statistics
The University of Sydney, NSW 2006, Australia

The lecture series is a series of books, published by Cambridge University Press, containing both research monographs and textbooks suitable for graduate and undergraduate students.

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

© Copyright The Australian Mathematical Society 2020