

School of Mathematics and Statistics Newsletter

September 2017

Welcome

- A very warm welcome to all our new research students starting this semester. New to the Solar Group are Teri Love, Callan Noble and Alex Prokopyszyn, all St Andrews graduates. Sam Wallace joins the Fluids Group and will be supervised jointly with the Met Office. New to the Statistics Division are Fanny Empacher, Filippo Franchini, Jing Wei and Andrew Seton. Gerard O'Reilly and Finlay Smith have joined the Algebra and Combinatorics Group, with Lawrence Lee coming to the Analysis Group. Part time and not located in St Andrews, Martin Macbeath is starting a PhD in the History of Mathematics.

Congratulations...

- to Oliver Allanson successfully defended his PhD thesis entitled 'Theory of one-dimensional Vlasov-Maxwell equilibria: with applications to collisionless current sheets and flux tubes'. Oliver has taken up a postdoctoral position to work on radiation belt physics at the Department of Meteorology, University of Reading.
- to Linnéa Franßen, Ben Williams, Hendrik-Jan Van Damme and Craig Johnston on winning the St Andrews Mathematics Postgraduate Annual Croquet Championship (SAMPACC), held at Cockshaugh Park on 3rd September.

Meetings Organised

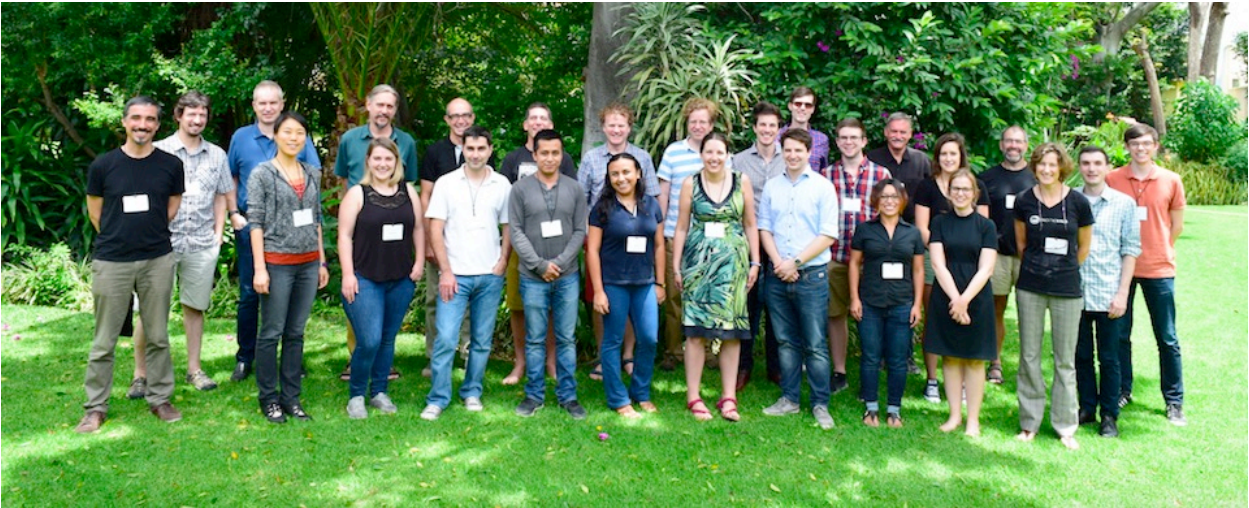
- The tenth in the series of *Groups St Andrews* conferences, started by Colin Campbell and Edmund Robertson in 1981, was *Groups St Andrews 2017 in Birmingham*, held at the University of Birmingham from 5-12th August. The organisers were our own Colin Campbell, Martyn Quick, Edmund Robertson and Colva Roney-Dougal, as well as Chris Parker from Birmingham. There were over two hundred participants including from St Andrews: Colin Bleak, Louis Theran, Alla Detinko, Markus Pfeiffer, Nayab Khalid, Adán Mordcovich and Mun See Chang. The last five all contributed talks.

The four main speakers, who each gave a series of four lectures, were Michael Aschbacher (Caltech), Pierre-Emmanuel Caprace (Université Catholique de Louvain), Radha Kessar (City, University of London) and Gunter Malle (TU Kaiserslautern). There were also six one-hour invited



talks and about a hundred contributed talks. There were a variety of social events including a wine and cheese reception, a brewery trip and a music evening. For the conference outing delegates could choose between a visit to Stratford-upon-Avon or Warwick Castle. The next *Groups St Andrews* meeting will be in Newcastle in 2021.

The only four people who have been to all 10 Groups St Andrews meetings: Gerhard Rosenberger, Rick Thomas, Colin Campbell, Edmund Robertson.



Participants at the Banff workshop on State-Space models

- Len Thomas co-organized a Workshop sponsored by the Banff International Research Station but hosted at the Casa Matematica Oaxaca in Mexico, on *New Perspectives on State-Space Models*. The attendees were a mix of statisticians, applied mathematicians and ecologists, including starting PhD student Fanny Empacher and our former colleague Ken Newman. The workshop went really well, despite getting off to a bumpy start (literally) with Hurricane Harvey disrupting several people's travel plans. For more details see <https://www.birs.ca/events/2017/5-day-workshops/17w5120/>
- On 3rd September Kenneth Falconer travelled to the Mittag-Leffler Institute on the outskirts of Stockholm where he is co-organiser of a three month programme *Fractal Geometry and Dynamics*. He gave the first talk in the seminar series that will run throughout the programme. To aid thought the Institute lays on unlimited coffee, cookies and fruit! The Mittag-Leffler Institute is the former home of Gösta Mittag-Leffler, the pioneering mathematical analyst, who on his death in 1927 donated his very large house and extensive library to the Royal Swedish Academy of Sciences to be run as a Mathematics Institute. Several members of the School, past and present, will be visiting the Institute during the programme to research in the splendid paneled rooms decorated with portraits and busts both of mathematicians and of Mittag-Leffler's relatives.

Grants

- Janine Illian, together with Peter Henrys of the CEH (Centre for Ecology and Hydrology), contacts at the SEPA (Scottish Environment Protection Agency) and others, was awarded SECURE (Statistics of Environmental Change, Resources and Ecosystems) Grand Challenge Feasibility funding of £15,000 for a project *Identifying optimal designs for quantifying spatial impacts of aquaculture*.
- Jon Fraser has had two joint projects funded by the Scottish Crucible: £3,900 for *Don't make a wave: understanding the dynamics of debate*, with Alice Toniolo from our School of Computer Science, and £4,520 for *A novel approach to quantifying the structural complexity of Scotland's maerl beds*, with Heidi Burdett from the Lyell Centre for Earth and Marine Science and Technology, Heriot-Watt.

Visitors

- Jon Fraser hosted a visit by Henna Koivusalo from the University of Vienna from 19-25th August. This was funded by an LMS Scheme 2 Grant for visits to the UK, which also paid for Henna to visit Glasgow and Durham.

Public Engagement

- In July, Claudia Faustino hosted 16 students in CREEM who were part of the *Summer at St Andrews* programme. She gave a presentation on ‘Monitoring wildlife populations’ and did some practical sampling activities.
- This week, 11-16th September, is *Maths Week Scotland* and various members of the School are putting on activities to promote mathematics. These include Maths Busking, a History of Maths Town Walk, a lecture at Madras College, a Display of Historic Mathematical Manuscripts and stands and lectures at the Dundee Science Centre, see <https://www.st-andrews.ac.uk/maths/news/title,1551517,en.php>

Visits and conferences

- The *Royal Statistical Society International Conference 2017* took place in Glasgow from 4-7th September. Amongst those from St Andrews who attended, Andy Lynch and Lindesay Scott-Hayward contributed talks and Cornelia Oedekoven and Valentin Popov presented posters. On a less formal note, Lindesay’s team came joint first in the conference quiz but lost on a tiebreak.
As a senior member of the Fisher Memorial Trust, Rosemary Bailey chaired the Fisher Memorial Lecture at the meeting. The lecture ‘And thereby hangs a tail: The strange history of P -values’ was given by Stephen Senn.
- Rosemary Bailey attended the workshop *Latest Advances in the Theory and Applications of Design and Analysis of Experiments* at the Banff International Research Station from 6-11th August. She gave a talk on ‘A substitute for square lattice designs for 36 treatments’. You can see the video at <http://www.birs.ca/events/2017/5-day-workshops/17w5007/videos/watch/201708081532-Bailey.html>
- Recently Janine Illian gave an invited talk entitled ‘Spatial point processes – theory and practice’ at the *Summer of Data* event in St Andrews, and another entitled ‘INLABRU – spatial modelling for ecological surveys’ at the *European Congress for Stereology and Image Analysis*, in Kaiserlautern. She also presented a poster at the annual *Scottish Crucible Alumni Meeting* entitled ‘Spatial modelling – from rainforests to terrorism’.
- Res Altwegg and David Maphisa from the University of Cape Town visited David Borchers for one and two weeks, respectively, to continue collaborative work developing new statistical methods of modelling bird species distribution in South Africa. Their visits were funded by David Borchers’ ‘Mentoring African Research in Mathematics’ programme grant from the London Mathematical Society, see <https://www.lms.ac.uk/grants/mentoring-african-research-mathematics>
- David Borchers was an invited participant at the *2017 International Snow Leopard and Ecosystem Forum* in Bishkek, Kyrgyz Republic, see <http://www.globalsnowleopard.org/> This involved high-level representation from all snow leopard range country governments, the United Nations Development Program, the International Union for the Conservation of Nature, the World Wildlife Fund, and many others. Among other things, it endorsed the plans of the Steering Committee of the Global Snow Leopard and Ecosystem Protection Program (GSLEP) for a range-wide survey in all 12 snow leopard countries. David gave an invited talk at the associated Science Symposium, on ‘spatial capture recapture’ methods for estimating snow leopard abundance and distribution, and participated in a workshop to begin developing plans for the range-wide survey. He will continue working with the GSLEP Steering Committee to develop and implement these plans.
- Colva Roney-Dougal gave the Mathematical Sciences Section Presidential Lecture at the *British Science Festival* in Brighton on 5th September. Her lecture ‘The Million-Dollar Shuffle: Symmetry and Complexity’ was followed by a reception sponsored by the London Mathematical Society.

- Whilst on a research visit to the Chinese University of Hong Kong from 8-17th August to work with De-Jun Feng, Jon Fraser gave two talks ‘Fourier transforms of measures on the Brownian graph’ and ‘(Almost) arithmetic progressions and Assouad dimension’.
- Alla Detinko gave several talks including ‘Computing with infinite linear groups: methods, algorithms and applications’ at the *London Algebra Colloquium*, ‘Computing with matrix groups over infinite fields’ at the University of Birmingham Algebra Seminar and ‘Zariski density and algorithms for infinite linear groups’ at *Groups St Andrews 2017 in Birmingham*.
- Alla Detinko visited Mathematisches Forschungsinstitut Oberwolfach (Oberwolfach Research Institute for Mathematics) for a month to work with Alexander Hulpke, from Colorado State University, and Dane Flannery of the National University of Ireland, Galway, to develop a new branch of computational group theory. The team was funded under the Research-in-Pairs scheme of MFO. She spent a subsequent month for the same purpose at the International Centre for Mathematical Sciences, Edinburgh, under their Research-in-Groups scheme.
- Over the summer, Alexander Konovalov undertook further training and became a Software and Data Carpentry Trainer; this terminology means that he is qualified to train others to be Data and Software Carpentry Instructors, see <http://www.datacarpentry.org/blog/new-trainer-cohort/> This is helpful for further Carpentries community building in the UK and across projects in which CIRCA is involved.
- In early September Alexander Konovalov attended the *Workshop on Sustainable Software for Science: Practice and Experiences* in Manchester <http://wssspe.researchcomputing.org.uk/wssspe5-1/> and then the *Second Conference of Research Software Engineers* <http://rse.ac.uk/conf2017/> where he gave a talk on managing external community contributions in grants that involve open source software projects.
- Chris Jefferson, Steve Linton, Markus Pfeiffer and Wilf Wilson, took part, for different periods, in *GAP Days* (Groups, Algorithms, Programs) at the University of Siegen, from 30th August-8th September, see <http://gapdays.de/gapdays2017-fall/> The program comprised the workshop followed by the GAP coding sprint, and significant progress has been made in many areas, including the preparation for the next major release of GAP 4.9.
- Magda Carr attended a start-up meeting for a special interest group (SIG) on surface waves and internal waves at the University of Bristol on 31st August-1st September. She got to be ‘famous for 3 minutes’ during the meeting!
- David Dritschel gave a plenary talk at the second *UK Fluids Conference*, held in Leeds from 6-8th September where he spoke about a new Lagrangian model of clouds.
- Helen Burgess and Jean Reinaud attended the *16th European Turbulence Conference* in Stockholm, 21st-24th August. Helen gave a talk on the scaling theory she has developed with Richard Scott and David Dritschel for vortices in two-dimensional turbulence, while Jean gave a talk on the interaction of oceanic vortices with a surface buoyancy filament.
- Several members of the Solar Group attended the *European Solar Physics Meeting* in Budapest from 4-8th September. Tom Howson, Hendrik-Jan Van Damme, Paolo Pagano and Ineke De Moortel all presented posters. Steph Yardley gave a contributed talk. Ineke was a member of the scientific organising committee and chaired one of the sessions.
- Ineke De Moortel visited Scott McIntosh at the High Altitude Observatory (HAO) in Boulder, Colorado from 21st-25th August to work on the analysis of observational data. Whilst there she joined colleagues from the HAO in Riverton, Wyoming to see the total solar eclipse on Monday 21st August.
- Hendrik-Jan Van Damme and Thomas Howson attended the STFC *Advanced Summer School in Solar System Plasmas* at the University of Central Lancashire from 28th August-1st September. They both presented talks on the behaviour of waves in the solar corona.

Future Events – Copson Lecture

- After an 8-year-long hiatus, our School's *Copson Lecture Series* will be continued on Friday 22nd September, 5.15pm in the Medical Sciences Building Lecture Theatre. The Lecture will be given by Vicky Neale, who is Whitehead Lecturer at the Mathematical Institute, University of Oxford and Supernumerary Fellow at Balliol College. The lecture will be entitled 'Closing the gap: the quest to understand prime numbers'. Vicky has sent the following summary:

Prime numbers have intrigued, inspired and infuriated mathematicians for millennia, and yet mathematicians' difficulty with answering simple questions about them reveals their depth and subtlety.

Join Vicky to learn about recent progress towards proving the famous *Twin Primes Conjecture*, and to hear the very different ways in which these breakthroughs have been made: a solo mathematician working in isolation, a young mathematician displaying creativity at the start of a career, a large collaboration that reveals much about how mathematicians go about their work.

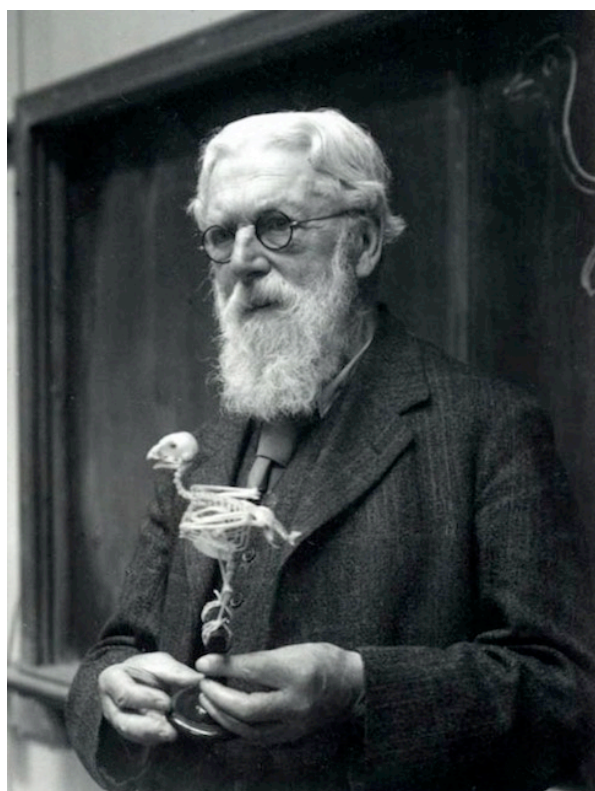
Future Events – D'Arcy Thompson Centenary

- In 1917 D'Arcy Thompson published *On Growth and Form* – a book which revolutionised biology by focusing on the importance of physical laws and mathematical ideas in the structure of living organisms. In the same year he was appointed Professor of Natural History at St Andrews, a post that he held until his death 31 years later.

Various events are being held in St Andrews and Dundee to mark the centenary of the book. In particular, Evelyn Fox Keller (MIT) will give a public lecture *Mathematics in Biology - Has D'Arcy Thompson been Vindicated?* on 14th October at 6.30pm in Parliament Hall. This is the Fauvel Lecture of the British Society for the History of Mathematics. The lecture is free, but you need to register at <https://www.eventbrite.co.uk/e/evelyn-fox-keller-the-fauvel-lecture-tickets-37333874624>

This lecture is part of a 3-day conference *On Growth and Form 100* on 13-15th October in Dundee and St Andrews. The full programme and registration details are available at

<https://www.ongrowthandform.org/conference/> This will be followed by a Newton Institute workshop at the University of Dundee 16-20th October on *Growth, Form and Self-Organisation in Living Systems* – see <https://www.newton.ac.uk/event/gfsw02>



D'Arcy Wentworth Thompson

Next Issue

- The next edition of the School Newsletter will be circulated in October. Items for inclusion may be sent to schoolnews@mcs.st-andrews.ac.uk at any time but a reminder will be sent out a week before the deadline.