

FLEET News October 2018

FLEET NEWS

This year's Nobel Prize in Physics saw a welcome, long-overdue change in the gender stats, with Donna Strickland the first woman Laureate in 55 years, recognised along with Gérard Mourou for their pioneering work on ultra-fast lasers. We took the opportunity to write about how we use this physics within FLEET's nodes at Swinburne and Monash (which you can read later in this newsletter).

We also include notes on a breakthrough study by Qiaoliang Bao (Monash) and an international collaboration published in Nature this month, which has received significant attention.

Finally, congratulations to Jared Cole and Andrew Peele, respectively becoming a FLEET CI and ATSE Fellow.

Read on for more about Jared and Andrew, and other news from around the Centre.

Regards,

Michael Fuhrer

Director

ARC Centre of Excellence in Future Low-Energy Electronics Technologies

Catch up on previous editions of FLEET News

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Just over a month until FLEET2018

FLEET's annual workshop is our opportunity for all Centre researchers to gather together and share research outcomes and progress.

- Pullman Magenta Shores, 2 hours north of Sydney
- 2–5 December
- FLEET.org.au/workshop2018



Program The [workshop schedule](#) is now available from the FLEET website

Family friendly We want this year's workshop to be even more family friendly than last year's. FLEET will provide onsite childcare, and families are invited to all workshop social events. We will try to coordinate something for families/partners to do each day (please send suggestions to Dianne Ruka).

Are you coming to ICON2DMat?

Registration is open for the 4th International Conference on Two-Dimensional Materials and Technologies in Melbourne. A limited number of discounted tickets for ANN members from interstate remain and we are still accepting abstracts for poster presentations (there are three 'best posters' awards up for grabs).



- FLEET.org.au/ICON2Dmat
- Melbourne, Victoria
- 10-13 December 2018
- ICON2DMat young scientist awards – \$1000 cash prize (closes today, 31 October)
- €600 in best poster prizes (applications close today, 31 October)
- Program ([online now](#)) includes 6 plenaries, 16 keynote talks, 148 oral presentations and >130 poster presentations
- Special editorial session with editors from high-impact journals

Nobel-winning physics

Half of this year's Nobel Prize for Physics was awarded to Gérard Mourou and Donna Strickland (shown right) for their method of generating high-intensity, ultra-short optical pulses

Mourou and Strickland's technique has had enormous impact across chemistry, physics and biology, and provides the basis for important scientific approaches used in FLEET's research.

This provided an opportunity to talk about FLEET research in the media in the context of the Prize, highlighting the work of Jeff Davis at Swinburne and Agustin Schiffrin at Monash.

[Read the story online.](#)



Physics undergrads exploring new physics at UNSW

UNSW physics undergrads have been measuring the quantum Hall effect (QHE), which FLEET regulars will know is a relatively new piece of physics recognised by the 1985 Nobel Prize in Physics, and requiring precision experimental setup, under the watchful supervision of FLEET's Karina Hudson.

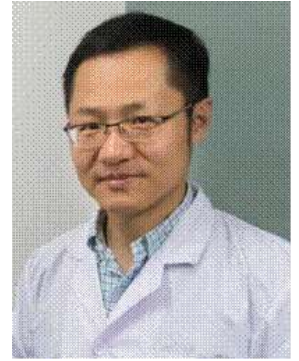
[Read more online.](#)



Breakthrough quantum discovery could deliver new electronics & communications tech

FLEET's Qiaoliang Bao (pictured right) at Monash University, with collaborators in Spain and China, discovered nanoscale squeezed light that propagates only in specific directions along thin slabs of molybdenum trioxide – a natural, anisotropic 2D material. The study was published in Nature this month, and has received significant media coverage on science platforms.

[Read more online.](#)



Lens focuses on Meera Parish and Michael Fuhrer

Cheaper, faster, smarter, smaller – the ever-evolving digital world has changed the way we live, as predicted by the law Gordon Moore outlined in 1965.

Monash University's Lens campaign this month focused on FLEET's Meera Parish (shown) and Michael Fuhrer, introducing readers to Moore's Law and atomically-thin materials along the way.

[Read more online.](#)



Congratulations Andrew Peele, ATSE Fellow

Australian Synchrotron Director Andrew Peele (pictured), who sits on FLEET's Advisory Committee, has been appointed a Fellow of the Australian Academy of Technology and Engineering.

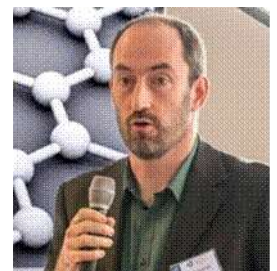
[Read about Andrew's leadership of the Synchrotron and AIP online.](#)



Congratulations Jared Cole, FLEET CI

Congratulations to RMIT Professor Jared Cole (right), now a FLEET Chief Investigator. Jared investigates the influence of dissipation and decoherence on electronic transport in nanostructures, and its role in electronic devices based on topologically protected conduction channels.

He is also an accomplished communicator – [read more online](#) including a couple of links to Jared's concise, compelling descriptions of complex physics on radio and in print.

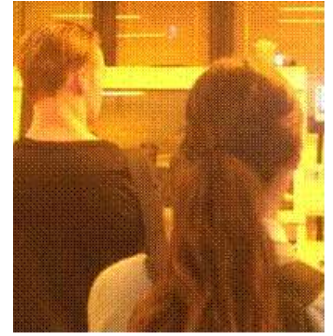


Physicists tour FLEET labs at RMIT

FLEET's RMIT labs recently hosted a tour by members of the Victorian branch of the Australian Institute of Physics, the country's leading body for physics advocacy and support. The AIP audience included a range of experience levels from undergraduate through to academics, and across half a dozen Melbourne universities.

The tour included the experimental laboratories and a briefing by RMIT node leader Prof Lan Wang, and AI Torben Daeneke, covering the research topics in Lan Wang's group, Jared Cole's group, JianZhen Ou's group and Torben Daeneke's group.

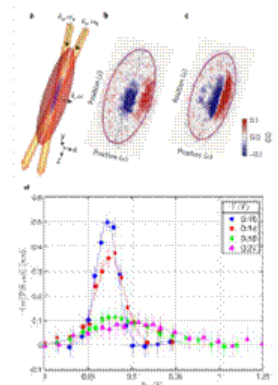
[Read more online.](#)



Live-streamed FLEET colloquium

FLEET's third live-streamed colloquium featured Carlos Kuhn (Swinburne University of Technology) discussing low-lying excitation spectra of unitary Fermi gases (illustrated, right).

Live-streamed colloquiums help us share research results across the Centre, keeping us all updated on latest FLEET research and enhancing cross-nodes collaborations. Research affiliates are warmly invited to attend.



FLEET Director Michael Director in sustainable material-science event, NZ

Michael Fuhrer spoke this month at the NZ sustainable material-science event, Materialise, an event that saw significant coverage in NZ mainstream and science media.

FLEET collaborators the MacDiarmid Institute organised the event, and surrounding coverage featured:

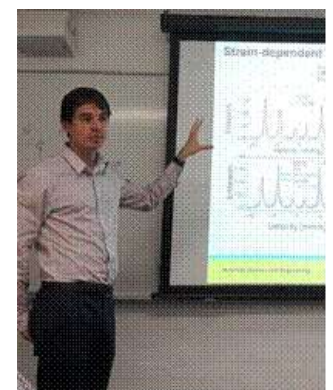
- [an online game](#) featuring a micro-sized Michael Fuhrer
- [radio interview](#) with MacDiarmid's Nicola Gaston
- [NZ Herald article](#) re sustainable energy research, ultra low energy electronics and other material science programs.
- [Interview](#) with Michael at The Spinoff.



We are fortunate to have a number of MacDiarmid researchers speaking at this year's FLEET annual workshop, so delegates will get the opportunity to learn about the Institute's research.

UNSW-UQ collaboration: Dan Sando taking ferromagnetics north

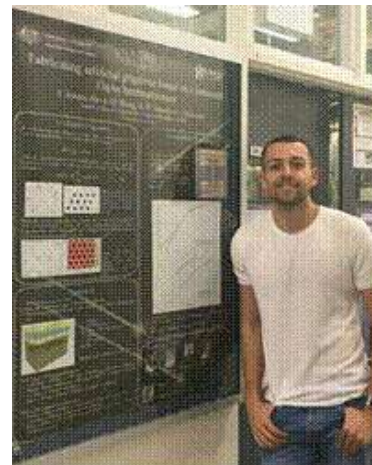
FLEET Research Fellow Dan Sando (UNSW, shown right) visited Centre colleagues at UQ this month, describing UNSW control of spin textures using strain in oxide thin films, in particular recent success at fabrication of BiInO₃ thin films, in pursuit of so-called 'persistent spin texture'. "It was good to get input from people who work in a completely different field within the same Centre," said Dan. "That different perspective sometimes helps find new directions to pursue."



Congratulations Yonatan

Congratulations to FLEET PhD Yonatan Ashlea Alava, whose poster was the winner in UNSW's School Research Expo!

Yonatan's poster described his study with artificial graphene in GaAs 2D quantum systems using nano patterning, and creation of a topological insulator based on this artificial graphene system with strong spin-orbit coupling.



Events in November

- 4–8 November International Conference for Young Researchers on Advanced Materials, Adelaide
- 22 November Science & Technology Australia AGM, Melbourne
- 25 November MRS Fall Meeting, Boston (USA)
- 26–28 November International Conference & Expo on Nanoscience & Nanotechnology, Barcelona (Spain)
- 26–28 November World Congress and Expo on Graphene & 2D Materials, Barcelona (Spain)
- 29 November FLEET Executive meeting

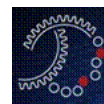
Coming up in December: FLEET workshop, ICON2DMat

Prizes & opportunities



The Melbourne Centre of Nanofabrication and ANFF Victoria are seeking Masters or PhD interns to be partnered with industry clients to work on 2-6 month internship projects.

Australian Nanotechnology Network (ANN) funding for members to travel to Australian National Fabrication Facility nodes. Open for postgraduate nanotech students and ECRs currently studying/working in Australia who are members of ANN



APR Intern provides internship opportunities within Australia for PhD students at various points in their candidature. See current opportunities online. A current position in Melbourne (generation of a solid model of a cutting tool) indicates skills FLEET affiliates might have, specifically programming, 3D graphics, etc.

The Australian Science Communicators offer a number of science-communications training opportunities in Sydney on 15 November, following their annual conference.



A number of FLEET research fellowships and positions have recently opened. We would appreciate your help in making excellent candidates aware of these opportunities to join FLEET.

We are seeking talented researchers to fill research fellow, Honours and PhD positions at Monash University, UNSW, the ANU, RMIT and Swinburne University of Technology.

Previous news

Monash University's Agent of Change campaign. In the near future the energy being used in computing is going to become unsustainable..."I realised I could change this". Michael Fuhrer talks ICT energy and atomically-thin materials: [Watch online](#).

Large-scale piezoelectric materials on tap at RMIT New opportunities for ultra-sensitive motion detectors will come from the first large-scale piezoelectric material deposition technique: developed by FLEET crew at RMIT. [Read more online](#).

Teasing out electron interaction effects at NUS FLEET AI Shaffique Adam and colleagues at the National University of Singapore have answered long-standing questions regarding the Fermi velocity in graphene varying on different substrates. [Read more](#).



Quantum anomaly found in 2D Fermi gas: Cosmos magazine Scaling symmetry in an ultracold 2D Fermi gas breaks down with strong interactions between particles: a quantum anomaly caused by strongly interacting particles. Chris Vale led this study at Swinburne University of Technology, which features in [this month's Cosmos magazine](#).

Welcome Max Congratulations to FLEET PhD Hong Liu (UNSW) and Research Fellow Weizhe Liu (Monash) whose new baby Max Liu is officially the first double-FLEET baby (patent pending).



Ferroelectric switching in van-der-Waals materials is a potential route for 'beyond CMOS' electronics and ultra-fast optoelectronics. FLEET's Changxi Zheng led this collaboration between Monash University and Chongqing University (China). [Read more online](#).

Building new partnerships: The Beijing Computational Science Research Center (CSRC) and Wroclaw University of Science and Technology have joined the 13 other leading Australian and international science organisations partnering with FLEET. [Read more online](#) and meet our two new Partner Investigators Hai-Qing Lin (CSRC) and Grzegorz Sęk.

Meet FLEET's Eli Estrecho who recently finished his PhD, and is now a postdoctoral researcher, working with Elena Ostrovskaya at the ANU. We asked Eli some questions about his research, how he got into physics, and about the thrill of fundamental discoveries. [Read more online](#).



Participating organisations

FLEET is: The Australian Research Council Centre of Excellence in Future Low-Energy Electronics Technologies.

Participating nodes are: the Australian National University, Monash University, RMIT University, Swinburne University of Technology, the University of New South Wales, the University of Queensland and the University of Wollongong.

