



FLEET

ARC CENTRE OF EXCELLENCE IN
FUTURE LOW-ENERGY
ELECTRONICS TECHNOLOGIES

FLEET News: July 2022

Greetings from Germany, where I am learning about topology and interactions, and enjoying a bit of summer heat and local wine, in Würzburg, home of one of FLEET's partner institutions, Julius-Maximilians-Universität Würzburg.

It was a pleasure to see everyone get together in person for the Centre's Annual Workshop last month, made a little bitter-sweet for me as I had to isolate! Still I am happy that the in-person event was a success for most: a stimulating and reinvigorating face-to-face exchanges of ideas with colleagues.



Read on and celebrate the latest achievements of FLEET's younger researchers.

Michael Fuhrer
Director, FLEET

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FLEET2022 Annual Workshop

FLEET2022 at Wollongong this month was the Centre's first in-person workshop in 2½ years. It was great to see members and families again.

FLEET's ECR training working group delivered a range of research development training sessions at the ECR workshop following on from the annual workshop. With the addition of a career-focussed veski program, the workshop focussed on career skills development and prompted critical thought and action towards their future careers. [Read more online.](#)



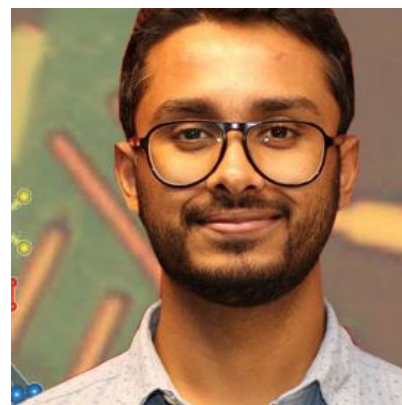
Brilliant alternative uses for diamonds

FLEET AI Dongchen Qi at QUT has applied liquid-metal techniques developed at RMIT towards making diamond conductive and switchable, with possible use in beyond-CMOS diamond transistors in future electronics [Read more at QUT](#).



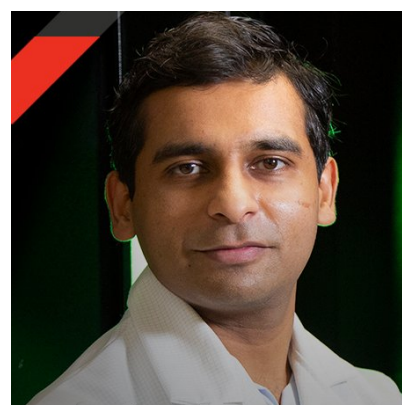
The hetero-interface is the key

New computational methods have been developed in papers led by Abin Varghese at Monash towards next-generation multifunctional optoelectronics such as flexible photosensors or LEDs. Emergent phenomena at the interface between selected materials in heterostructures offer better platforms than the intrinsic materials for new, specific device applications. [Read more online](#).



Sumeet Walia Eureka Prize nomination

Congratulations to Sumeet Walia (RMIT), who has been named a finalist in the prestigious Australia Museum Eureka Prizes – the country's top science awards. An Associate Professor in the School of Engineering at RMIT and Associate Investigator in FLEET, Sumeet is short-listed for the Eureka Prize for an Emerging Leader in Science. [Watch Sumeet's explanation](#): unlocking new phenomena in materials.



inSTEM conference: towards a more diverse science community

The inSTEM conference (Brisbane this month) was a networking and career-development conference for people from marginalised or underrepresented groups in STEM, and their allies.

The two-day event was an opportunity for scientists to connect with others from marginalised or under-represented groups, develop valuable professional networks, building networking skills and strategies supporting personal career development, and discuss strategies to improve Australia's scientific diversity, increasing access, retention and success for diverse groups.

FLEET participation included nine delegates attending in-person and five more attending virtually. [Read more online](#).



Outstanding author nomination: Qile Li

Congratulations to Qile Li, Monash University PhD candidate in the School of Physics and Astronomy, who was nominated for Award for the Science Faculty's 'Outstanding Author Contribution' award for his paper on large magnetic gaps in ferromagnet-topological insulator heterostructures. [Read about the paper here.](#)



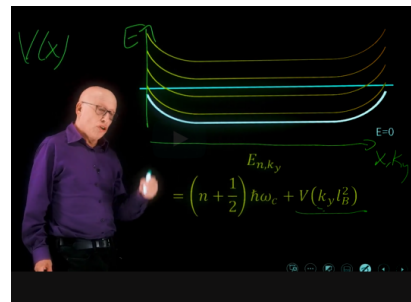
Liquid metal podcast ep

A nice podcast episode has been recorded on manipulation of liquid gallium, with Michael Dickey (North Carolina State University) collaborating with FLEET's Xiaolin Wang and Yahua He (University of Wollongong), and Kourosh Kalantar-Zadeh and Jianbo Tang (UNSW). [Listen online.](#)



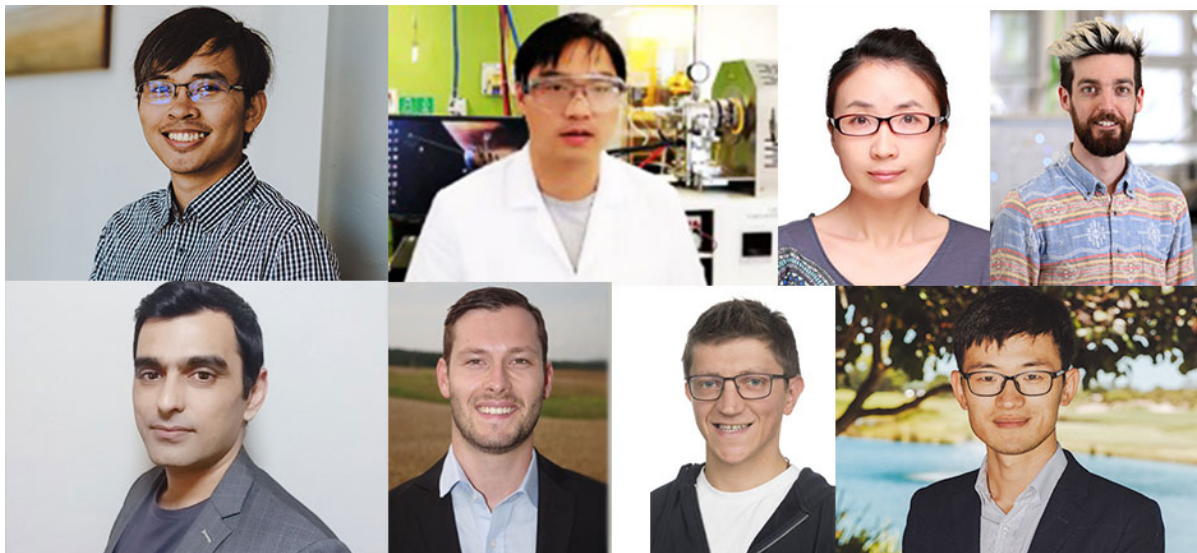
Topological quantum matter course

An impressive new online Weizmann Institute of Science course brings together many areas of interest to FLEET researchers, explaining the Quantum Hall effects, topological superconductors, topological insulators, and semi-metals, graphene, including twisted bi-layers, topological classification, material properties predictive techniques, experimental tools and states of topological order. [Watch the course introduction / read more.](#)

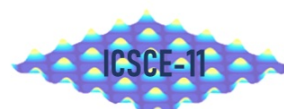


ECR authors in July

Congratulations to FLEET's early-career researchers who were first, second or third authors on papers published this month: Eliezer Estrecho, Guangsai Yang, Lina Sang, Matthew Rendell, Matthias Wurdack, Muhammad Nadeem, Olivier Bleu, Weiyao Zhao. See more in [FLEET publications](#).



The **11th International Conference on Spontaneous Coherence of Excitons** (ICSCE-11) will be held in Burlington, Vermont, USA, **7-11 August 2022**.



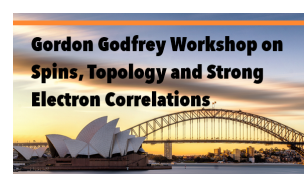
The Frontiers of Matter Wave Optics (FOMO) conference and summer school in Trieste, Italy **12-23 September** will cover matter-wave physics theory, technology, gravimetry; quantum sensing; modelling of ultra-cold quantum devices.



The Recent Progress of Graphene and Two-Dimensional Materials Research conference (RPGR2022), to be held in Taipei, Taiwan **13-17 November 2022** will cover the latest developments in graphene and other 2D crystals, and enhance 2D physics, material science and devices.



The 2022 Gordon Godfrey workshop on spins, topology and strong electron correlations will be held **21-25 November** at UNSW. An informal poster session for students and ECRs allows for very easy submission: all that's needed is a poster title, which is simply entered into the online registration form.



The 10th International Conference on Advanced Materials & Nanotechnology (AMN10) will be held in Roturua, New Zealand, **6-10 February 2023**. This meeting is sponsored by FLEET partner organisation the MacDiarmid Institute and covers a broad variety of topics in nanotechnology and materials science. To receive updates and advise your intent to attend, please **register your interest** online.



Catch up on past talks

If you missed any recent FLEET seminars or other talks you can catch up on YouTube:

- Eli Estrecho,(ANU) **Non-Hermitian topology in exciton polariton systems**
- **Academia and beyond Q&A videos** (ECR working group)
- Lu Li (Michigan) **Quantum Oscillations of Electrical Resistivity in an Insulator**
- Harley Scammell (UNSW) **Exciton condensation in bilayer graphene**
- Ana Maria Rey (JILA, U. Colorado) **Optical lattice clocks**
- Mitko Oldfield (Monash) **Pint of Science talk**

Grants and opportunities

The Victorian government will provide \$100 million in pre-seed investment funding to the five state universities over five years to support research commercialisation, with university startups and spinouts to receive up to \$1 million each.

Main Sequence Ventures (CSIRO's investment arm) deep-tech newsletter features over 40 companies with 300+ jobs on offer. **Sign up for the newsletter** to stay informed.

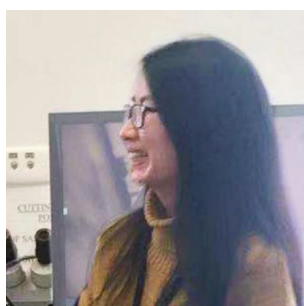
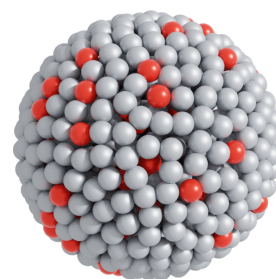
Nano Letters and ACS's new Seed Grants competition will provide US\$2500 for high-risk, high-reward nano' research proposal ideas from later-stage graduate students (third year+).

Interested in an **industry internship**? See active positions at [APR Interns](#).

- **Women in FLEET scholarships** and **Diversity in FLEET scholarships** are open to students who are accepted into an Honours or PhD program to work with any one of FLEET's investigators. Considered twice a year in June and November. Submit applications anytime.
- Keep an eye on the [FLEET grants page](#) for multiple ongoing opportunities.

Previous news

Liquid platinum at room temperature Liquid platinum study provides cheaper, more-efficient, reliable chemical reactions – a pathway to dramatic emissions reductions. The cool new study combines researchers from the ARC Centre of Excellence in Exciton Science and FLEET at UNSW and RMIT. [Read more online.](#)



Seeking the Majorana fermion in topological superconductors PhD

candidate Lina Sang at UOW led a new FLEET collaboration with RMIT, UNSW and Tsinghua tracking the hunt for the elusive Majorana fermion, which is both matter and antimatter, in iron-based superconductors. Majorana fermions hold promise for zero-resistance paths in ultra-low energy electronics, while Majorana zero-energy modes in topological superconductors make those materials the main

candidate materials for realising topological quantum computing. [Read more online.](#)

Nanophotonics in TMDCs at Monash Around 30 FLEET members and affiliates gathered at Monash last month to hear Luca Sortino (visiting from Ludwig-Maximilians-Universität München) present our first in-person FLEET seminar in a long while. We took the opportunity to share lunch and catch up for some long overdue chats over coffee and sandwiches.

Semiconductor industry briefings Recordings are available from recent Semiconductor Industry Association (SIA) briefings on work towards the semiconductor industry 'Decadal Plan' from DARPA/SRC JUMP programs.

- **Episode 1** covered compute/memory devices, edge computing, and tracking data growth towards energy consumption and carbon footprint.
- **Episode 2** included semiconductor hardware, THz communications & sensing, heterogeneous integration, THz/mm transistors in wireless systems (thermal bottlenecks), new materials and approaches in memory/storage, and cross-layer design.

Sumeet Walia/ATSE group boosting women in STEM FLEET AI Sumeet Walia at RMIT joins a group of 16 Australian Academy of Technology and Engineering (ATSE) STEM champions from across industry and academia to guide 500 undergraduate and postgraduate scholarships over 7 years to women in science. [Read more about the new group online.](#)



FLEET rural outreach FLEET dispatched another outreach expedition to Victoria's west last month, with outreach coordinator Jason Major and COO Tich-Lam Nguyen

and 3rd laws and learned a bit about FLEET's research to develop low-energy electronics.

The International Conference on the Physics of Semiconductors (ICPS) at the end of June in Sydney covered electronic, structural, optical, magnetic and transport properties of materials. FLEET was a sponsor of the ICPS, with Director Michael Fuhrer, Al Sue Coppersmith and Centre advisor Francois Peeters all involved on committees or as plenary/invited speakers, along with other Centre speakers.

Participating organisations

FLEET is The Australian Research Council Centre of Excellence in Future Low-Energy Electronics Technologies. Read more about our **participating nodes** and **partners** online.



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