

FLEET News: July 2021

This month's newsletter includes topological fingerprints, high-temperature superconductors, and layered ferromagnets. Read on for these stories and other news from around the Centre.



We are pleased to report that FLEET has received formal feedback from the ARC mid-term review panel, and feedback was very positive. The panellists had great things to say about the contributions of the interviewees.

Regards,
Prof Michael Fuhrer
Director, FLEET

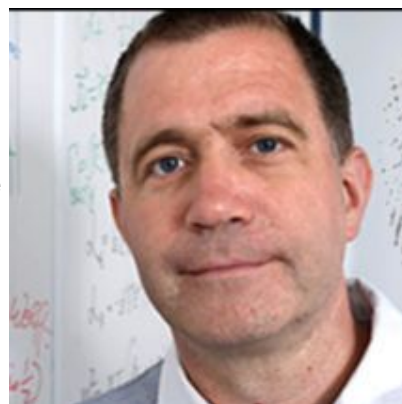
In this edition:

- **Identifying a topological fingerprint** (UNSW)
- **Effects of pressure on Fe-based superconductors** (UOW)
- **Transforming a layered ferromagnet** (RMIT, UOW, UNSW)
- **Three-minute FLEET PhDs** (Monash, SUT)
- **Congratulations Dhaneesh** (Monash)
- **Video toolkits** (UNSW)
- **New 2D ARC Hub features FLEET talent**
- **Professional skills resources**
- **Research impact training**
- **Semiconductor industry news**
- **Talks and events coming up / FLEET 2020**
- **Congratulations to FLEET's ECR authors**
- **Standing up for respect in the workplace**
- **Fresh Science and other opportunities**

- **Congratulations to FLEET's ECR authors**
- **Standing up for respect in the workplace**
- **Fresh Science and other opportunities**

Identifying a topological fingerprint

A new theoretical study led by FLEET's Dimi Culcer at UNSW has identified a 'smoking gun' in the long, ongoing search for the topological magnetic monopole referred to as the Berry curvature. This breakthrough in the search for topological effects in non-equilibrium systems opens paths towards low-energy topological electronics viable for large-scale, room-temperature operation. [Read more online.](#)



Reviewing effects of pressure on iron-based superconductors

Lina Sang's new UOW/FLEET study in *Materials Today Physics* reviewed progress on high-pressure studies of iron-based superconductors, examining use of pressure as a versatile method for exploring new materials.

[Read more online.](#)



Transforming a layered ferromagnet for future spintronics

An international collaboration led by FLEET Research Fellow Cheng Tan (RMIT) has achieved record-high electron doping in the layered vdW ferromagnet F5GT, causing magnetic phase transition with significant promise for future electronics. The project brought together talents from three FLEET nodes (RMIT, UOW, UNSW) and partner organisation the High Magnetic Field Laboratory (China). [Read more online.](#)



FLEET PhDs describe their research for three minute thesis

Tackling the next climate crisis with polariton superfluids, chocolate bars and chaotic gardening...

FLEET's Rishabh Mishra (Swinburne), Mitko Oldfield and Alex Nguyen (both at Monash University) recently recorded short, pithy explanations of their PhD research, submitted for the 2021 national Three Minute Thesis competition. [Watch the videos online.](#)



Congratulations Dhaneesh

Congratulations to FLEET's Dhaneesh Kumar, who was awarded his PhD in July (squeaking in nicely between lockdown IV and lockdown V).

It was a big month for Dhaneesh, who also finally tied the knot with his fiancée Lyn.



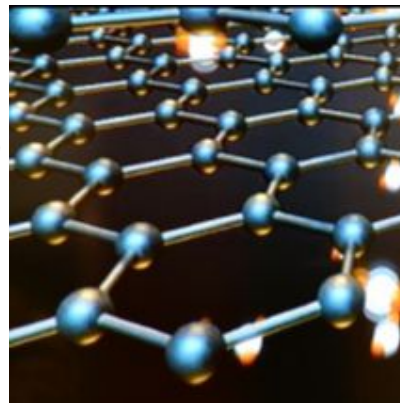
Video toolkits from UNSW

A new series of explainer videos produced by the FLEET's team at UNSW introduces some of the most-useful tools in novel materials synthesis and study. The series of videos, produced by FLEET and UNSW scientists, briefly introduces key tools and techniques used to create materials used in the search for a new generation of future, low-energy electronics. [See the videos online.](#)



New 2D ARC Hub features FLEET talent

A new ARC Research Hub highlighting the role of novel and 2D materials in energy storage, purification and printed electronics features FLEET talent amongst its team: Kouros Kalantar-Zadeh (UNSW) and Nikhil Medhekar (Monash). [Read more about the new ARC Hub.](#)

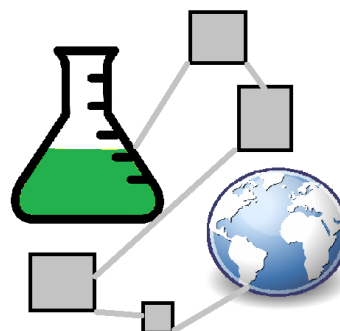


Professional skills resources

Developing transferable skills is vital for scientists at all career stages, but most particularly for PhDs and other early-career researchers, to maximise their options inside and outside of academia. Last year a team from across FLEET put together [this list of resources](#) to improve these skills.

Research impact training in 2021

Eight FLEET participants will undertake a four-week shortened version of the Crux Innovation research-impact course. Thanks to new FLEET PhD student Abhay Gupta for sharing his positive experience to prospective participants.



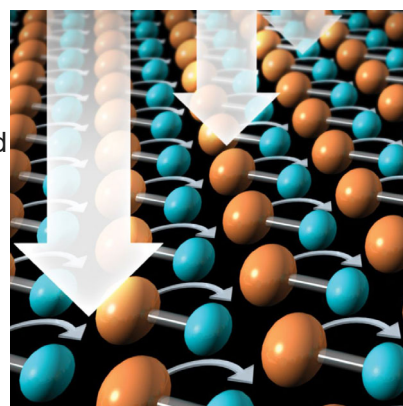
FLEET is committed to equipping our members with practical tools for maximising research impact, including learning how to pitch research benefits to industry and other stakeholders. Last year, two FLEET teams participated in the Ascend program: [Read about the 2020 Ascend program online.](#)

Semiconductor industry news

China's efforts in semiconductors have taken a step up in recent years, spotlighted by both the new Chinese space station and Mars rover featuring 100% indigenously designed-and-produced semiconductors. And regardless of less-than-stellar financial performance at would-be semiconductor champion Tsinghua Unigroup, the country saw over 50,000 new semiconductor firms started in 2020. [Read more online.](#)

Topological materials and transistors introduced at IEEE

The IEEE's hugely popular *Spectrum* magazine has spotlighted topological materials in a 'beginners guide' type article this month, including their potential use in future computers and consumer electronics, with developments in topological transistors explained by FLEET's own Michael Fuhrer. [Read the article.](#)



Talks and events coming up

Don't miss these events, coming up in the next month:

- 4 August Jennifer MacLeod (QUT) [Controlling surface growth of molecular nanoarchitectures](#)

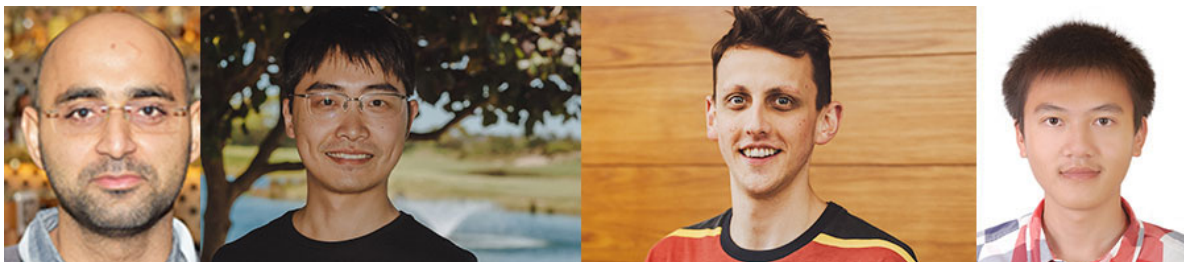
- 10 August Steve Duvall (Silanna) and colleagues will share their experiences **commercialising semiconductor research**
- 19 August FLEET is co-sponsoring the **National Science Quiz**, which will feature FLEET's own Jared Cole (RMIT) as one of the panelists
- 25 August Laura Faulconer (Antler) **deep-tech and a start-up career**

Or, catch up with these recent FLEET talks and presentations:

- Tami Pereg-Barnea (McGill) **Domain/skyrmion-bound surface states of magnetic TIs**
- Jeanie Lau (Ohio) **Tunable edge states in vdW materials**
- Sarah Jaber **Careers in collaborations**
- Michael Barson (Monash) **Quantum microscopy**

Congratulations to our ECR authors this month

Congratulations to Pankaj Bhalla, Haoran Mu, Jackson Smith and Qile Li... who are first or second authors in our **most-recent publications**.



Standing up for respect in the workplace

Over 200 top Australian CEOs have pledged to address sexual harassment and make their organisation a safe workplace for everyone. DCA has shared three simple but effective acts that individuals can take to stand up for safe workplaces: watch powerful testimonies ([here](#)), hear from prominent CEOs ([webinar 24 August](#)) and pledge action ([here](#)).

Fresh Science: engage!

Hone your communication skills, learn how to effectively pitch your science to media, public, industry and government.



Nominations are open for Fresh Science, with ten ECRs in each state gaining a day of free training, the opportunity to present in public, and media coverage for their science. Deadline 2 August. [See nomination details](#)

Quantum Australia 2021

The (online and in-person) Quantum Australia conference and careers fair will bring together world-leading quantum researchers, businesses,



government decision-makers, startups, and big tech to share developments and ideas. For information about presenters, networking, and the careers fair (entry free for students) see [Quantum-australia.com/quantum-australia-2021](https://quantum-australia.com/quantum-australia-2021)

The highly flexible Sydney Quantum Academy visitor program is also seeking interest, with capacity for projects from education to policy to research. [More details online.](#)

EMCR forum

What do early-and mid-career researchers need for their careers to be sustainable? Check out Science Pathways 2021: Sustainable Careers', promising thought-provoking discussions around the future of work (whether in academia, industry, or govt), managing work-life responsibilities, looking after our mental health, and building a more inclusive STEM sector, and more.



In person and/or online, including panel discussions, professional development, and networking. Launches 25-26 November at the University of Melbourne (and online), followed by three online-only events in early-December. [Register online.](#)

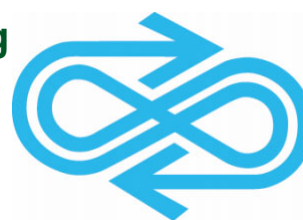
Rebooting computing

The 6th IEEE International Conference on Rebooting Computing will be held online in Nov/Dec 2021, soliciting original papers on future computing technologies of all types. More info (and imminent deadlines) at ICRC.ieee.org or see rebootingcomputing.ieee.org for more information on the IEEE Rebooting Computing Initiative.



Bring your physics to the AIP summer meeting

Abstract submissions are now open for the Australian Institute of Physics Summer Meeting (6–9 December) at QUT in Brisbane. FLEET's Iolanda Di Bernardo (Monash) and Dongchen Qi (QUT) are encouraging all FLEET physicists to consider attending to present their research. [Details online.](#)



ECR women writing workshop

Learn tips from the experts on writing grant applications and scientific papers, at ANU in September. The workshop is aimed at strengthening the scientific writing, critical thinking and communication skills, providing mentoring, transparent peer review and centralised writing training opportunities. The workshop is currently planned to be onsite at ANU, with an online backup plan. [More information online.](#) Applications close 31 July.



Other grants and opportunities

For outreach/development opportunities see [In2science](#) mentoring, and [CSIRO STEM Professionals in Schools](#).

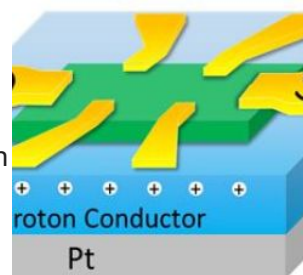
Interested in an **industry internship**? [APR Interns](#) are again advertising positions.



Neuromorphic computing PhD scholarships are available with FLEET partner organisation MacDiarmid Institute, based at UCNZ, Christchurch New Zealand. [Read more online](#).

Previous news

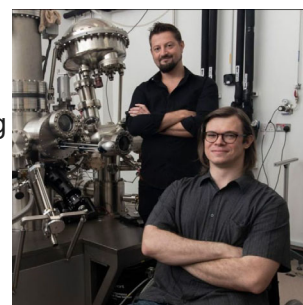
Controlling spin with iron, protons Magnetic-spin interactions, allowing spin-manipulation by electrical control, permit potential applications in energy-efficient spintronics: RMIT-led collaboration published this month in *Nature Communications* with Guolin Zhang, Lan Wang and FLEET partner investigator Mingliang Tian at the High Magnetic Field Laboratory (Anhui). [Read more](#).



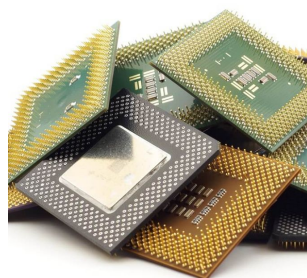
Congratulations Meera and Agustin Congratulations to two of FLEET's Chief Investigators, whose contributions have recently been recognised by the School of Physics and Astronomy at Monash University: Meera Parish promoted to full Professor, and Agustin Schiffrin promoted to Associate Professor [Read more](#).

Electrons on the edge: 2D QAHE review

FLEET AI Bent Weber (NTU) has led a review of materials and theory advances wrt two-dimensional QAHE, surveying the library of promising atomically-thin quantum spin Hall insulators with view on classical and quantum electronic device applications. [Read more](#).

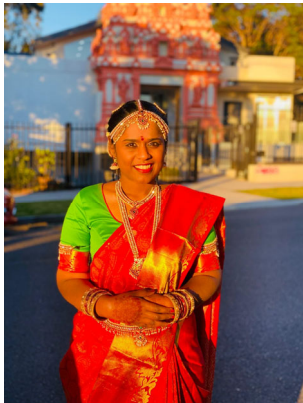


Industry news: Michael Fuhrer on



chipageddon The global semiconductor shortage is wreaking havoc across multiple industries, and raises a longer-term challenge in plateauing efficiency of CMOS chips. FLEET's Michael Fuhrer talked to Cosmos magazine about semiconductor manufacture and the end of Moore's Law. [Read the article](#) | [Read the explainer](#)

Engaging with end-users: Melbourne Computer Club Engaging with the Melbourne computing and electronics community in a ‘fireside chat’ forum this month, FLEET’s Torben Daeneke (RMIT) and Iolanda Di Bernardo (Monash) explained to the audience what the intrinsic limitations of the current CMOS-based technology are, and what some of the approaches are that FLEET members are looking into how to address these issues. [Read more.](#)



Congratulations Vivasha Govinden FLEET PhD student Vivasha Govinden had her hard work rewarded by a UNSW writing scholarship for the examination of her thesis, which she submitted at the end of May.

Vivasha also tied the knot this month (see pic, left), in a wonderful wedding celebration that included Nagy Valanoor putting his material science skills to work breaking open a coconut.

International lab collaboration in times of Covid How does global research collaboration work, while Covid still prevents international in-lab visits? FLEET’s Matthias Wurdack (ANU) and Semonti Bhattacharyya (Monash) worked with collaborators at Columbia University to find a creative solution, running in-lab demonstrations of new quantum technologies across multiple university labs on two continents. [Read more.](#)

Cute alert! Welcome Nicole Xiang Congratulations to Feixiang Xiang (UNSW) and partner Nina Zhu, who welcomed the safe arrival of their lovely baby daughter Nicole in June.



Congratulations Congratulations to Jemima Goodwin (UQ) – the newest Women in FLEET Honours scholar – and Tommy Bartolo (RMIT), who has received a FLEET writeup scholarship (which was introduced based on needs and concerns identified in the member survey). [Read more.](#)

Australian STEM recognised in Shanghai rankings Great results for STEM in Australian universities in the Shanghai/ARWU 2021 rankings, with Australian universities represented in the world top-100 for all the natural sciences and engineering disciplines except maths. [See highlights amongst FLEET’s participating nodes.](#)

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.

