



# FLEET

ARC CENTRE OF EXCELLENCE IN  
FUTURE LOW-ENERGY  
ELECTRONICS TECHNOLOGIES

## FLEET News: September 2023

This edition of FLEET News includes a superconducting review, quantum control and outreach news, alumni profile, and new Executive Officer.

Also, coming up is the first information session for an industry-meets-science hackathon, running with five other COEs. [More below.](#)

Michael Fuhrer  
Director, FLEET



---

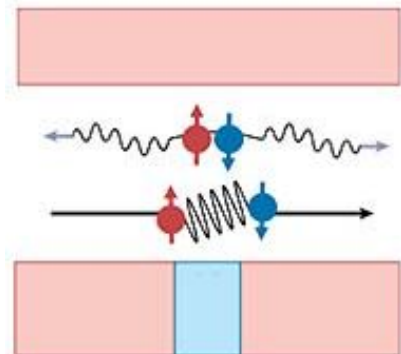
### In this edition of FLEET News:

- [Examining the superconductor diode effect](#) (UOW, Monash)
- [Alumni profile: Wafa Afzal alum](#)
- [Boost for quantum phase control](#) (Monash)
- [Multi-COE industry-meets-science hackathon](#)
- [Ops Team news: Farewell Tenille, welcome Nandhini](#)
- [Mitko takes 3MT silver](#) (Monash)
- [Nanomagnets on radio](#) (Newcastle)
- [FLEET ECR authors this month](#)
- [Atomic acoustics coverage](#) (UNSW)
- [More talks online](#)

---

## Superconducting diode effect review

A Wollongong/Monash collaboration led by Muhammad Nadeem has reviewed the superconducting diode effect, one of the most fascinating phenomena recently discovered in quantum condensed-matter physics. A superconducting diode enables dissipationless supercurrent to flow in only one direction, providing new functionalities for superconducting circuits. [Read more online.](#)



## FLEET alumni Wafa Afzal

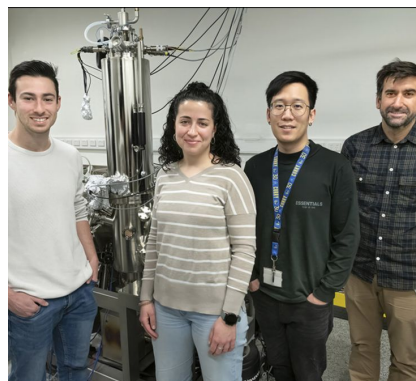
FLEET PhD graduate (ex UOW) Wafa Afzal is still pursuing novel materials' functions, now at Archer Materials, designing and integrating innovative materials for operating qubits in quantum technologies. She reports that FLEET's training towards innovative collaborative work, and working towards a shared goal, still helps focus her research efforts. [Read more online.](#)



---

## Research uplift for quantum control

Congratulations to FLEET and other awardees of the Monash Faculty of Science Research Uplift Scheme, including Daniel Moreno Cerrada, Amelia Dominguez Celorrio, Agustin Schiffrin and Nikhil Medhekar, awarded \$3000 to progress electric-field control of quantum phases in 2D metal-organic nanomaterials.



---

## Industry-meets science hackathon

The 2024 Better Futures 'industry meets research' hackathon will assign multidisciplinary teams of five COEs' researchers to solve industry challenges, with \$30,000 research funding plus \$15,000 prize money for the best solution.

Find out more at the first information session 1 November: [sign up online.](#)



---

## Farewell Tenille

We bid a sad farewell to FLEET EO Tenille Ibbotson last month, as she moves on to a great new gig managing the Art, Design and Architecture Department at Monash.

"While it's always a blow to lose talented and dedicated staff like Tenille, it's also a pleasure to see our people pushing themselves and moving on to new opportunities," says FLEET Director Michael Fuhrer.



## Welcome Nadhini

We're also very pleased to welcome Dr Nandhini Nehru who is FLEET's new Executive Officer, starting next week. Dr Nehru has 5+ years experience in physics and materials engineering research and her most recent role was Coordinator of the Monash Energy Institute.



---

## Mitko wins 3MT silver

Congratulations to Mitko Oldfield for winning second prize at the Monash all-university round of the 3MT competition. Mitko represented the Faculty of Science and competed against 11 other presenters across the range of Monash faculties.



---

## Nanomagnets on radio

Karen Livesey (University of Newcastle) hit the airwaves this month to describe applications of nanomagnets in medicine and data storage, pathways to physics, and the ongoing AIP Women in Physics lecture tour. [Listen here](#) (Karen's interview starts at 1hr 22min).

Meanwhile Australian Chief Scientist (and previous FLEET Advisor) Cathy Foley was interviewed for a recent article in Physics World, speaking about accessing networks of experts, 4AM starts, the value of practising talks and extracurricular efforts such as schools outreach. [Read the article](#).



---

## Upcoming FLEET Events...

**Advanced AFM seminar** (UNSW 10AM 19 Oct) Nanoscale electrical measurement suppliers PrimeNano will present advances in room-temperature and low-temperature electrical AFM measurements, including scanning microwave microscopy. In person at UNSW or join on zoom ([email Kath Tajer](#) for details).

**Meet FLEET** (UNSW, 20 Oct) [FLEET.org.au/industry](https://fleets.org.au/industry) An event where key industry, VC and government contacts can meet with FLEET researchers. For Centre members and partners it will be a great opportunity to promote your work and establish connections with potential investors and end-users. Please [contact Tich-Lam](#) for details if you'd like to join us.

The **2023 Gordon Godfrey workshop** 20-24 November at UNSW will see presentations across spins, topology and strong electron correlations, and features an informal poster session for students and ECRs. **Sign up online.**

**FLEET legacy workshop** (Gold Coast, 29 Nov to 1 Dec) Our final Centre-wide event will shape how we communicate FLEET's impact to the research community and beyond, and offer a platform for future collaboration conversations, networking, and idea exchange.

---

## Jobs board

The FLEET "jobs board" at [FLEET.org.au/jobs-board](https://fleet.org.au/jobs-board) is a useful resource for people looking for future positions. If you know of any positions of interest, let us know and we'll add them. Group leaders, we're happy to list your new positions here too.

---

## FLEET ECRs publishing in September

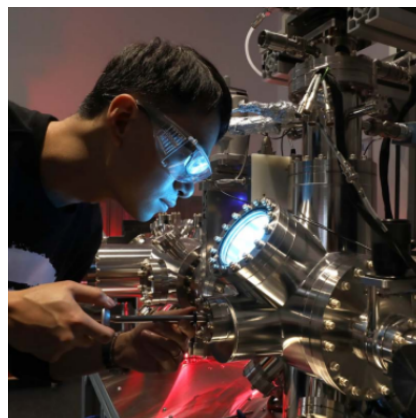
Congratulations to our early-career researchers who were authors on papers published this month: Chi Yuan ([Liquid-metal solvents for nanoporous metals](#)) and Brendan Mulkerin ([Virial expansion for optical response](#)). See more in [FLEET publications](#).



---

## Listening to atoms moving at the nanoscale: UNSW story

A nice UNSW news story covers Cam Phu Nguyen and Jan Seidel's recent *Nature Communications* paper on discontinuities studies via nanoscale acoustics (reported in last month FLEET News). [Read the UNSW article here.](#)



## Other events & opportunities

**Semi Down Under** at the Sydney Nano Institute 13 October will combine a talk on 3D/2.5D semiconductor integration technology with networking.

**The 2023 AIP Physics in Industry Day: The Future of Semiconductors** will be held in Sydney Thursday, 2 November 2023.

**The Australian Institute of Physics/Optics and Photonics (ANZCOP-AIP) Summer Meeting** will run 3–8 December at ANU. The AIP's lower-cost summer meetings are a great opportunity for Australian/Kiwi post-doctoral researchers and PhD students.

**The 1st International Conference in Quantum Energy** in Melbourne 4-6 December 2023 will examine the role of quantum technologies in future energy challenges and opportunities.

---

## Catch up on past talks

FLEET seminars and talks are available to catch up on YouTube:

- Hui Deng (Michigan) **Different phases of polariton lasers**
- Ying Liu (Sydney) **Domains, interfaces and nanoscale phenomena in ferro- and antiferroelectric materials**
- Flore Kunst (Max Planck) **Exceptional non-Hermitian topology**
- Patjaree Aukarasereenont (RMIT) **Liquid metal platforms for synthesis of 2D materials**

---

## Grants and opportunities

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+). Closes 1 Sept.

For ongoing outreach/development opportunities see **In2science** mentoring, and **CSIRO STEM Professionals in Schools**

---

## Previous news

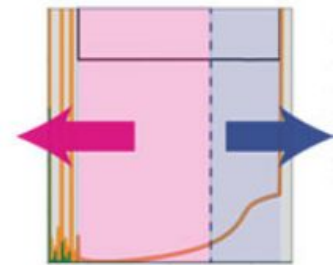
**Liquid metals feature** "There's something compelling, even a little supernatural, about a metal in the liquid state." A nice feature on liquid metal catalysts at *Chemistry World* last month brought together work from Torben Daeneke (RMIT), Kourosh Kalantar-zadeh (Sydney and UNSW) and Nicola Gaston (MacDiarmid Institute). [Read the article online.](#)



**Listening to nanoscale earthquakes** A recent UNSW-led paper in *Nature Communications* presents a new way to listen to 'the crackling' noise of atoms shifting when materials are deformed, providing potential improved methods for discontinuities in novel, new materials, such as those proposed for future domain-wall electronics. For more about the study led by Cam Phu Nguyen, [read the story online.](#)

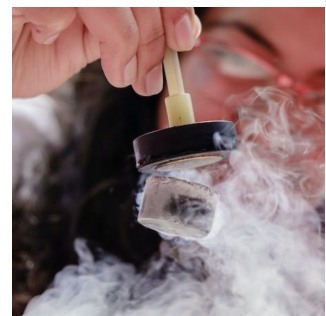
### **Topological gardening' to achieve unexpected spin transport**

'Trimming' the edge-states of a topological insulator yields a new class of material featuring unconventional 'two way' edge transport in a theoretical study led by Yuefeng Yin at Monash. The new material, a topological crystalline insulator, forms a promising addition to the topological materials family, significantly broadening the scope of materials with topologically nontrivial properties. [Read more online.](#)



**Hareem Khan FLEET alum** Meet FLEET alum Hareem Khan, previously at RMIT and now a postdoc at CSIRO's Solar Technologies group, where she is applying materials skills learned at FLEET/RMIT to improve solar technologies. [Read Hareem's profile online.](#)

**Capitalising on condensed matter in the news** On the back of high enthusiasm for condensed-matter physics and quantum materials in general media and public spheres, FLEET's Michael Fuhrer penned an article about LK-99 for *The Conversation*: [Hopes fade for 'room temperature superconductor' LK-99, but quantum zero-resistance research continues.](#)



**Outreach bonanza** August has always been a busy month in science outreach, and FLEET volunteers were kept busy engaging with students and public at **university open days, the Sydney Science Trail, Three Minute Thesis and the National Science Quiz**, reaching over 3000 students and public in one month. Volunteers were too numerous to list, but thank you to everyone who helped make FLEET science outreach a success in August.



## 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.



**Australian Government**  
**Australian Research Council**