FLEET ARC CENTRE OF EXCELLENCE IN FUTURE LOW-ENERGY ELECTRONICS TECHNOLOGIES

FLEET News: October 2021

We have some cause for celebration at FLEET with the first newsletter in quite some time with no Centre nodes in lockdown (and I don't want to jinx it, but dare I hope the last?)

A new physics prize at Monash honours the memory of FLEET's Shaun Johnstone.

Read on for exciting research and other news from around the Centre.

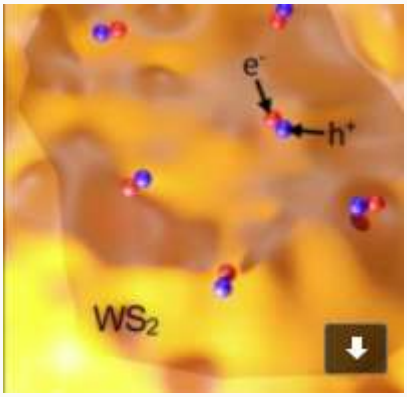
Regards,
Prof Michael Fuhrer
Director, FLEET

In this edition:

New physics prize honours Shaun Johnstone

A new Monash award honours the memory of FLEET's Shaun Johnstone, who passed away in December 2019. The Shaun Johnstone Prize will be awarded for the best paper written by a PhD student in experimental physics or astronomy published in the past year. **Read more online**.

Sandwich-style construction allows step toward exciton electronics



A new ‘sandwich-style’ fabrication process by ANU-Swinburne has enabled an exciton-polariton breakthrough, coupling excitons in 2D material to light in the first-ever demonstration of long-range propagation without lost dissipation of energy, at room temperature. This is a significant step towards ultra-low energy electronics based on light-matter hybrid particles, exciton-polaritons. **Read more online**.

Illuminating the path to topological electronics with ultra-short bursts of light

Ultra-short or infinitely long: it all looks the same. FLEET researchers at Swinburne and ANU show that ultra-short pulses of light (34 femtoseconds) elicit the same response as continuous illumination. The experiment harnessed interactions between real and virtual states to ‘switch’ the electronic state of atomically-thin (2D) WS_2, aiding the search for future low-energy electronics based on exotic topological materials.

Read more online.

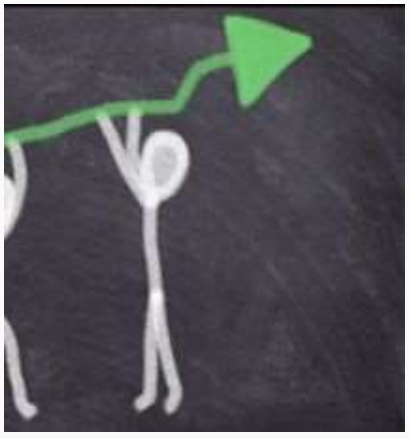
Stress can be good for you: enhancing piezoelectric properties under pressure

Enhancing piezoelectric properties under pressure at UNSW with Daniel Sando and Oliver Paull discovering a new exotic state of a room-temperature multiferroic, with exciting implications for future technology. **Read more online**.

New WIF/diversity fellowships

Diverse teams do better science. To maximise the effectiveness of our research team, FLEET has added a Diversity category to existing Women in FLEET fellowships, opening them up to a wider range of applicants from underrepresented groups in Australian STEM. More information **on the FLEET website**.

Future leaders



FLEET is developing the next generation of science leaders, and fostering equity and diversity in STEM, with career and leadership support for women in FLEET working towards achieving both of these goals. Four FLEET women have secured scholarships for the 2022 Leading Edge program. Congratulations to Abigail Goff (RMIT), Maedehsadat Mousavi (UNSW), Nicci Coad (RMIT) and Tenille Ibbotson (Ops Team). **Read more online**.

Ask a Physicist

FLEET's new "**Ask the physicists**" page encourages schoolkids, parents and others to ask their hardest, most-baffling questions and we'll answer them (or, we'll find a FLEET member who can).

Quantum Australia is back on

In another welcome sign of things returning to some sort of normalcy, dates have been announced for the Quantum Australia 2022 conference and careers fair, which was postponed this year. FLEET is co-sponsoring the event, in February 2022.

Quantum Australia will bring together world-leading quantum researchers, businesses, government decision-makers, start-ups, and big tech. For information about presenters, networking, posters and the careers fair (entry free for students) **see the website**.

PhDs submitted, new roles

Congratulations to a trio of FLEET PhD students who have submitted their PhDs this month, the culmination of many years hard work. Congratulations to:

- Muhammad Nadeem (UOW) studying Chern magnetism in topological insulators
- Yonatan Ashlea Alava (UNSW) artificial graphene fabrication and TIs
- Tatek Lemma (Swinburne) multidimensional spectroscopy study of light-induced currents in 3D TIs.

And congratulations to Dhaneesh Kumar (Monash) for his new postdoc role at the Max Planck Institute for Solid State Research in Stuttgart, Germany, and Vivasha Govinden (UNSW) for her postdoc role at the Oak Ridge National Lab in Arkansas, US.

Multiferroics conference this month

The APTC Workshop on Multiferroics will host discussions of materials exhibiting more than one type of built-in order (eg, magnetism and ferroelectricity), including multiferroic domain engineering, electromagnon excitation and manipulation, artificial multiferroic heterostructures, vdW materials and topological defects. Read more and register at **FLEET.org.au/multiferroics**

Semiconductor industry news

Following on from the NSW Chief Scientist 2020 report on the Australian semiconductor industry, the NSW govt is establishing a new office to enhance capability, workforce, market connectedness and competitiveness of NSW/Australia's semiconductor sector, as well as addressing market frictions and failure points. **Read about the new office**.

Hear FLEET Director Michael Fuhrer on the future of semiconductors in a **Cosmos panel** examining the issue (or **read the article**), and **commenting for the AFR**.

Talks and events coming up

Don't miss next week's ANSTO-FLEET seminar on accelerator science, with ANSTO's Ceri Brenner. **Register here**.

Catch up on:

- Susan Coppersmith,(FLEET UNSW) **Quantum stochastic resonance**
- Mykhailo Klymenko (Exciton Science RMIT) **Optical response of 2D semiconductors**
- Francesca Iacopi (TMOS/FLEET UTS) **wafer-scale graphene synthesis**
- Elena Ostrovskaya (FLEET ANU) exciton-polaritons via the presentations folder on **the FLEET intranet**

Congratulations to our ECR authors this month

Congratulations to the following FLEET students and ECRs who are the first, second or third author in our **most recent publications**: Hien Nguyen, Cheng Tan, Oliver Paull, Tinghe Yun and Matthias Wurdack.

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**.

IEEE: Rebooting computing and GreenCom

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 at **ICRC.ieee.org** or see **rebootingcomputing.ieee.org**. The 17th IEEE **International Conference on Green Computing and Communications** will follow soon after, in Melbourne, 6-8 December.

Bring your physics to the AIP summer meeting

Registrations are still open for the Australian Institute of Physics Summer Meeting (6–9 December) at QUT in Brisbane, which will have a parallel online format for interstate physicists. FLEET is sponsoring this year's poster session. **Details online**.

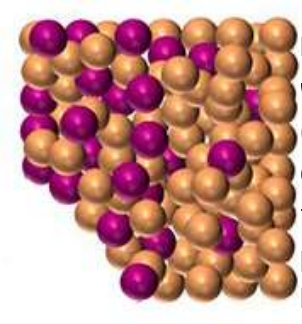
Other grants and opportunities

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

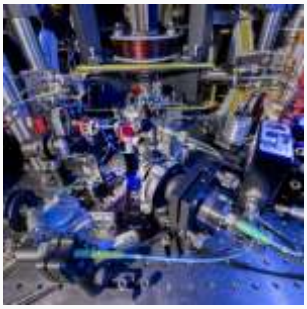
Interested in an **industry internship**? See active positions at **APR Interns**.

Previous news

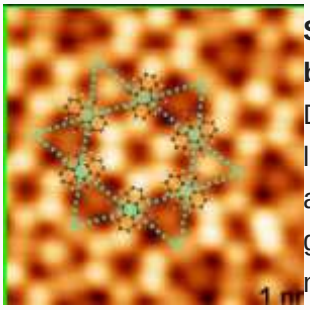
Electrons on the edge: large-bandgap intrinsic magnetic TI An Intrinsic magnetic topological insulator with large band gap– discovered in a study led by Chi Xuan Trang and Qile Li (Monash) is a promising material platform for fabricating ultra-low-energy electronics and observing exotic quantum phenomena. **Read more**.



Elements in liquid metals compete to win the surface A study led by Mohammad Bagher Ghasemian (UNSW/CASLEO) investigates surface competition between elements as an approach for harvesting mixed-metal oxide sheets for use in electronics and optics, proposing new horizons for the production of large 2D electronic materials from the surface of liquid metals. **Read more**.



Switching on a superfluid A Swinburne study led by Paul Dyke examines systems transitioning from 'normal' fluid to superfluid, revealing properties of the transition associated with different dynamical processes, with a view to switching off and on future, superfluid-based technologies. **Read more**.



Star attraction: magnetism generated by star-like arrangement A study led by Dhaneesh Kumar (Monash) demonstrated the emergence of localised magnetism due to a 2D nanomaterial's unique, star-like atomic-scale structure has potential for applications in next-generation beyond-CMOS electronics based on organic nanomaterials, where tuning of electronic interactions can lead to a vast range of new electronic and magnetic phases. **Read more**.

New FLEET EO Tenille Ibbotson is FLEET's new Executive Officer, based at Monash with the Centre Operations team. Tenille will be providing expert support to FLEET projects, staff and governance functions across all seven nodes, using her experience with the Brain Function COE and management roles at Uni Melbourne and ANU.

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.