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

FLEET News: January 2020

It's a pleasure to front this first newsletter of 2020 as incoming Chair of FLEET's Communication Committee (thanks to Nagy for his great work in the last three years!).

It will be a big year for Centre comms, with the mid-term review looming, stepping up communication with relevant industry people, and improving internal comms.

Read on for news about the bushfire/climate-change letter signed by FLEET Director Michael Fuhrer and 80 other ARC Laureates, our own environmental investigations, and a bumper crop of research from around the Centre, out this month.

Regards,
Dr David Cortie
Chair, FLEET Communication Committee

Catch up on previous editions of FLEET News

In this edition:

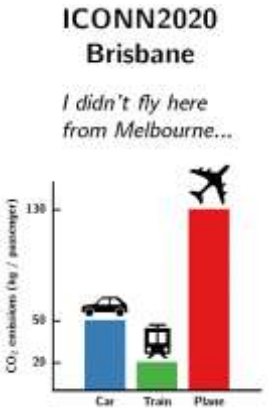
Bushfires and the environment

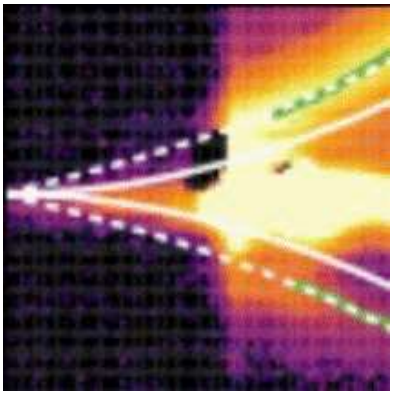
Unfortunately, this year's ANU Physics Summer School, which was to explore spontaneous, collective quantum phenomena, was cancelled due to health risks of bushfire smoke.

It is an issue that has been front of mind for much of Australia this summer. FLEET Director Michael Fuhrer was one of 80 ARC Laureates to sign an open letter on bushfires and climate change, released today. Read coverage online, or read the letter.

While FLEET's aim is to reduce the world's ICT power consumption, we know that some of the work we do today is having a detrimental effect on tomorrow's environment. The nine members of FLEET's new Environmental working group are taking a microscope to the environmental impact of FLEET.

One early output has been a tool to calculate and compare emissions from different forms of transport to scientific meetings, which the team will make available to others. The graphic shows this tool's calculations for an upcoming meeting in Brisbane, which Jackson and an Exciton Science colleague are travelling to by train (there's a Tshirt!).



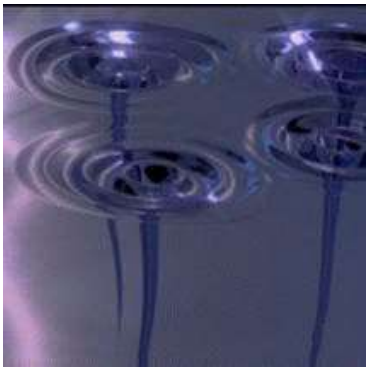


Ghostly particles detected in condensates of light and matter

Quantum fluids are not forever. A FLEET collaboration makes the first detection of ‘ghost particles’ from Bose-Einstein condensates. The ANU/Monash study observed quantum depletion for the first time in a non-equilibrium condensate.

Read more online.

Quantum tornado on a silicon chip



Self-forming quantum liquids on a silicon chip could revolutionise our understanding of turbulence – "the oldest unsolved problem in physics” – enabling new, precise navigation technologies.

Read more about this FLEET-UQ collaboration with EQUS online.

Congratulations Elena

Congratulations to FLEET's Elena Ostrovskaya, whose promotion to full Professor at the ANU is recognition of her brilliant research and hard work. Elena leads FLEET's exciton-superfluid research theme and as outgoing Chair of the Centre's equity & diversity committee led FLEET equity initiatives from 2017-2019.

Elena is shown here opening the 10th International Conference on Spontaneous Coherence in Excitonic Systems in Melbourne this week – hosted by FLEET and featuring a number of speakers from FLEET's research theme 2 and 3.

Meet the speakers.

'Designer defects' for domain-wall nanoelectronics

A FLEET-UNSW study published this month in Nature Communications presents an exciting step towards stable domain-wall nanoelectronics. Engineering defects in ferroelectrics provides the key to massively improved polarisation stability, over one year (a 2000% improvement).

Read more online.

Liquid metal shows superfluid-like properties at UOW

Inspired by superfluids' near-zero surface tension, FLEET's Xiaolin Wang and Frank Yun (UOW) discovered voltage-induced superfluid-like penetration in liquid gallium at room temperature for the first time.

Read more online.

Welcome Alab, 'burning passion'

Congratulations to FLEET's Eli Estrecho and wife Roxanne, on the arrival of baby Alab.

From Eli: "Alab is a Filipino word for 'fire' or 'burning' or can be 'burning passion' (we decided on the name before beginning of this year's tragic unfortunate bushfires). We do hope and pray that the people's burning passion and compassion will accelerate Australia's bushfire recovery."

Nano-thin touchscreens

FLEET's Torben Daeneke worked on a RMIT-Monash-UNSW collaboration to develop an ultra-thin, ultra-flexible electronic material, able to be printed and rolled out like newspaper, for the touchscreens of the future. The touch-responsive technology is 100 times thinner than existing touchscreen materials and so pliable it can be rolled up like a tube.

Read more online.

New Chairs

Welcome to the five new incoming Chairs of FLEET's governing committees. The five new Chairs will each bring renewed enthusiasm and new ideas to these important committees. Thanks in particular to the two AIs taking this step up to Centre leadership, David and Torben.

The new Chairs are:

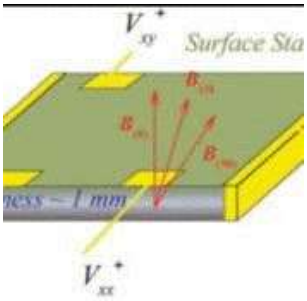
- **Torben Daeneke** (RMIT) Industry Relations Committee
- **David Cortie** (UoW) Communications Committee
- **Jared Cole** (RMIT) Education and Training Committee
- **Jeff Davis** (Swinburne) Equity and Diversity Committee
- **Meera Parish** (Monash) Outreach Committee.

Thanks also to the outgoing Chairs for their extremely hard work over the last three years!

Internships APR

Current research internship opportunities listed at Australian Postgraduate Research Intern include defence science and intelligent materials. APR Intern provides short-term university research collaborations. Ask FLEET Education and Training coordinator Dianne Ruka for additional details.

Previous news



Chemistry/engineering collaboration reveals new TI A material combining wide bandgap and robust, topological surface state could enable room-temperature operation of ultra-energy efficient electronics. Read about this new FLEET/UOW/Monash collaboration online

FLEET's three researchers at **Science meets Parliament** last month pitched FLEET and their own research to parliamentarians and other scientists from around the country Read more online.

Kourosh Kalantar-Zadeh was awarded the Royal Society of NSW 2019 Walter Burfitt Prize, recognising research in liquid metals, atomically thin materials and sensors. Read more about the award 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.