# FLEET

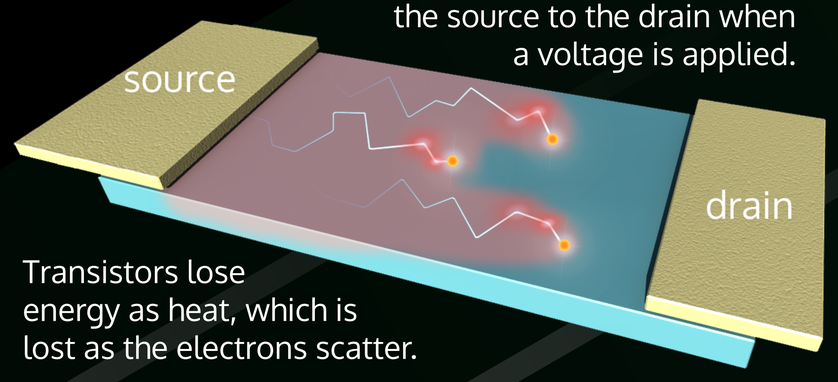
ARC CENTRE OF EXCELLENCE IN FUTURE LOW-ENERGY ELECTRONICS TECHNOLOGIES

## FLEET is developing a new generation of ultra-low energy devices

Computing power is achieved through electronic switches called **transistors.**

Smart phones contain up to two billion transistors, with computers having even more.

In transistors, electrons move from the source to the drain when a voltage is applied.




Transistors lose energy as heat, which is lost as the electrons scatter.

IT energy consumption is doubling every decade.

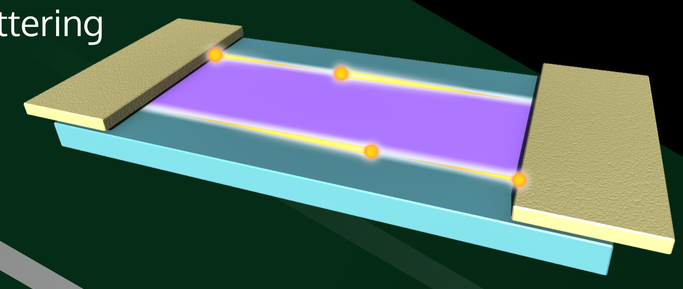
We need more-efficient transistors!

FLEET connects researchers from Australian universities to experts around the world.

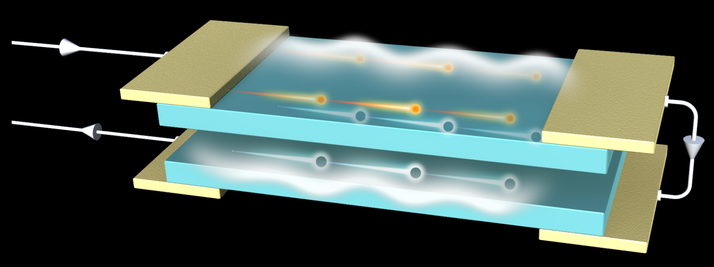
ansto · Australian Synchrotron · Caltech · Columbia University in the City of New York · JQI Joint Quantum Institute · MPQ · NUS Centre for Advanced 2D Materials · University of Colorado Boulder · Universität Mainz · University of Maryland · Julius-Maximilians-Universität Würzburg · TEXAS The University of Texas at Austin

FLEET uses three main approaches to create materials in which electrons are prevented from scattering, and thus have ultra-low resistance:

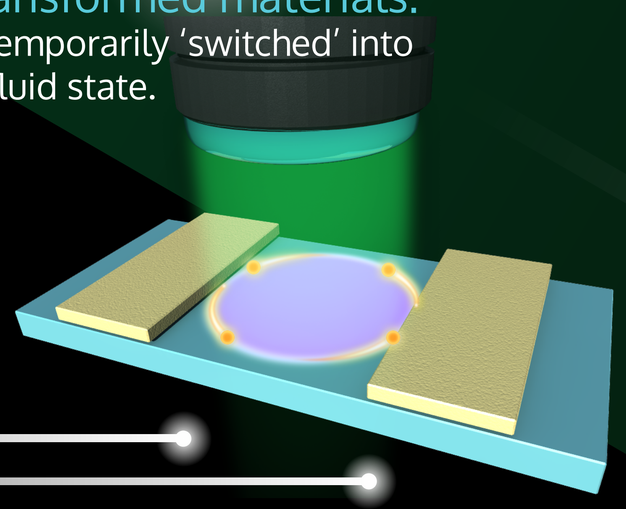
**Theme 1 - Topological materials:** the edges of which conduct electricity along one-dimensional paths that do not allow for electron scattering and thus have ultra-low resistance.



**Theme 2 - Exciton superfluids:** bound pairs of charged particles that flow without resistance. Exciton transistors will switch off and on just like conventional transistors, but without dissipating energy.



**Theme 3 - Light-transformed materials:** materials that can be temporarily 'switched' into a topological or superfluid state.



The work is underpinned by the science of atomically thin materials and nanofabrication.

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