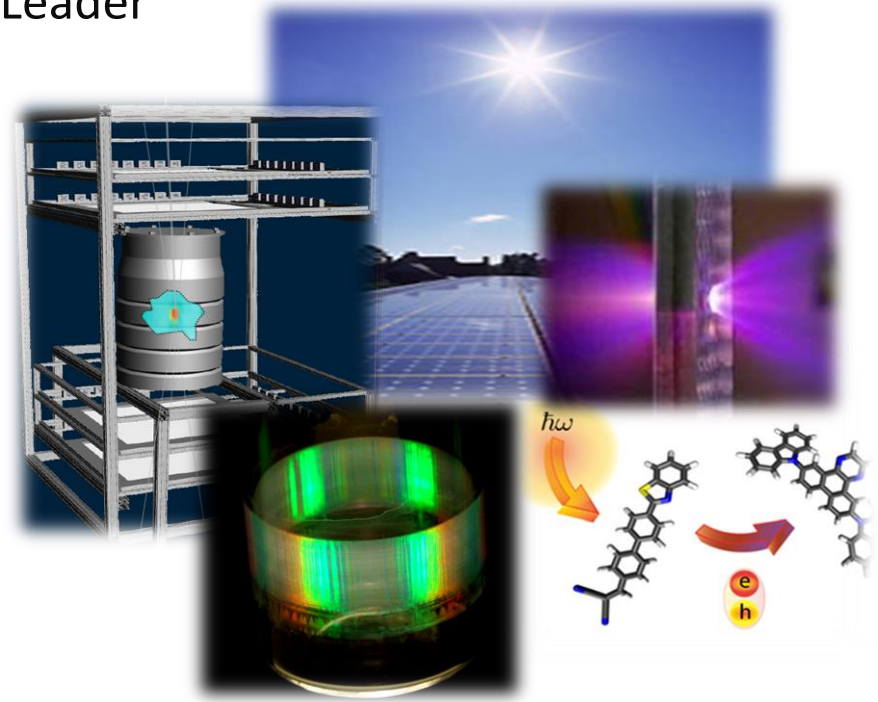
SUPA Energy Theme

Theme Management Committee:

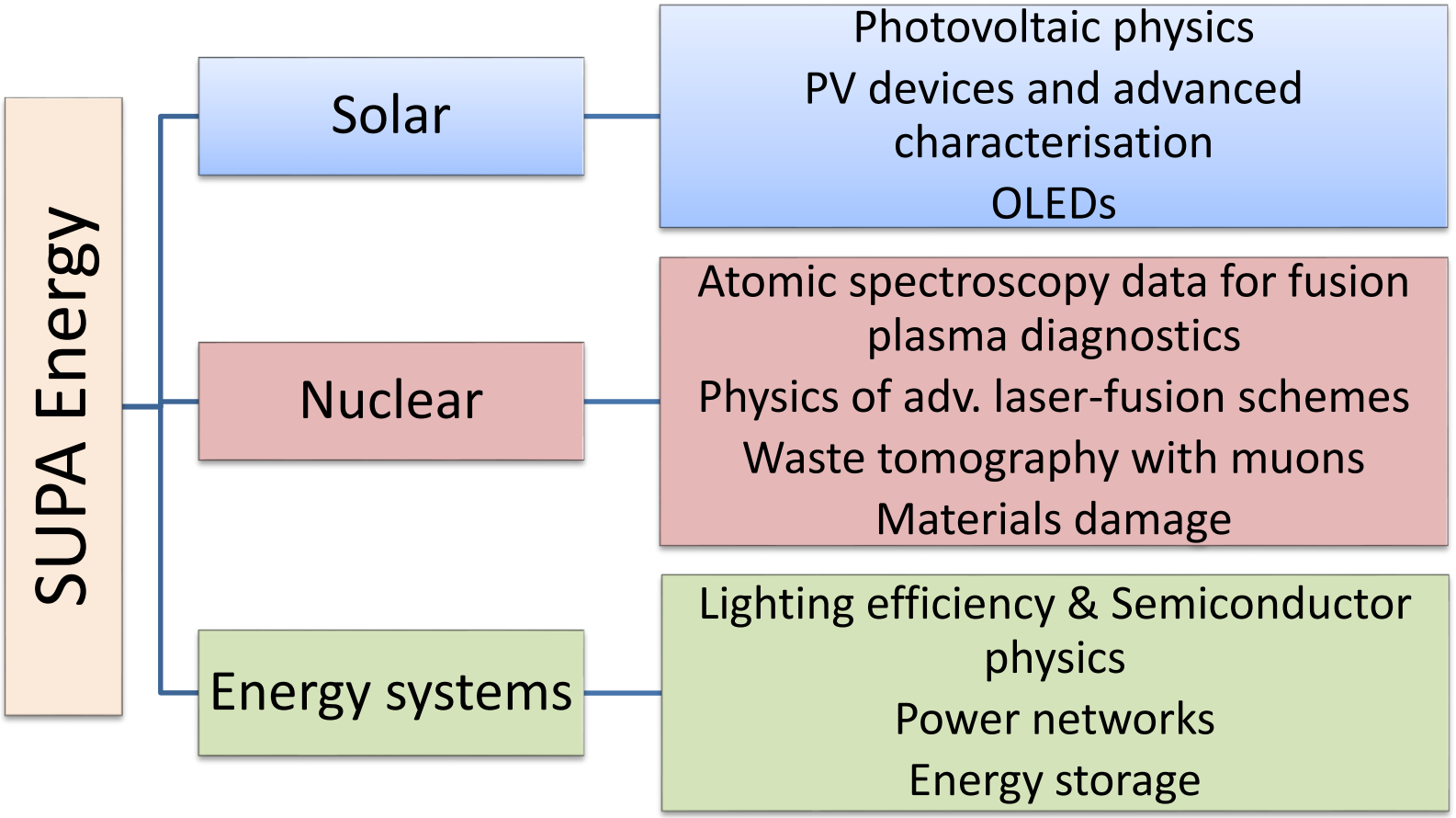
Paul McKenna (Strathclyde) – Theme Leader

Ifor Samuel (St. Andrews)
Murilo da Silva Baptista (Aberdeen)
Job Thijssen (Edinburgh)
Steve Reynolds (Dundee)
Des Gibson (UWS)
David Hamilton (Glasgow)
Tadhg O'Donovah (Heriot-Watt)



Theme overview

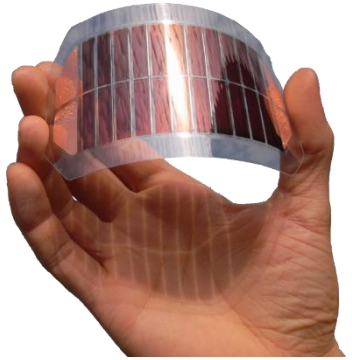
- ~25 academics, ~30 postdocs, and ~40 PhD students across the 8 SUPA institutions with energy as a core element of their research
- Almost all members of this theme are members of other themes



Solar physics

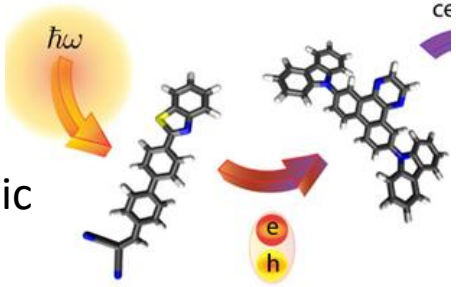
Significant grant funding:

- Innovate UK & EPSRC, Energy Catalyst: Integrating a Novel Freeze Tolerance Approach with Flat Plate Solar Thermal Panels (H-W); £200k; 2016-17 - NEW
- Innovate UK Energy Catalyst: Integration of Thermal Storage with Solar Collector Design (H-W & Soltropy Ltd); £200k; 2017-18 - NEW
- ERC Adv. Investigator Award on Exciton Diffusion (St. A); €2.1M; 2013-18
- EPSRC Self Assembled Photovoltaic Materials photovoltaic materials (St.A & SU); £328k; 2014-17
- ~£65k Global challenges to develop OPV in collaboration with University of Campinas and University of Sao Paulo in Brazil (St.A); 2016 - NEW



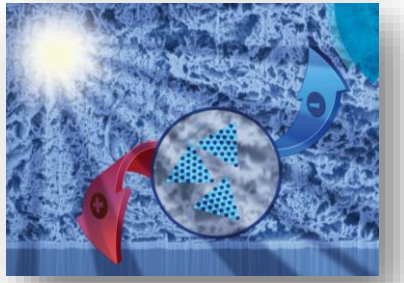
Solar physics

Prizes and esteem:



- 2016 Chemical Dynamics Prize for Ifor Samuel (St.A) from the Royal Society of Chemistry
- Running ERPOS 2017 in St Andrews – one of the longest running organic semiconductor conferences, including energy sessions
- Joint St.A & SU successful bid to host ICSM 2020 in Glasgow – the largest Organic Semiconductor Conference
- Associate Editor, Journal of Photonics for Energy (Samuel, St.A)

High profile publications:



- *Chemical Reviews* 2017 - Light harvesting for organic photovoltaics (St.A)
- *Science Advances* 2016 - Intersystem crossing in a thermally activated delayed fluorescence copper complex in the solid state (St.A)
- *Advanced Materials* 2017 on Exciton diffusion length and charge extraction yield in organic bilayer solar cells (St.A)
- *Phys. Rev. Letts.* 2016 – Photocell optimisation (Lovett, St. A)
- *Solar Energy* 2017 - photovoltaic modules (O'Donovan, H-W)

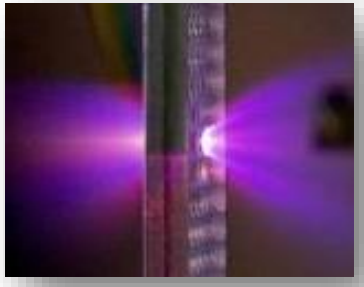
Fusion and legacy nuclear waste

Prizes and esteem:

- David Mahon (GU) won an RSE Enterprise Fellowship for developing the muon detector business
- A new spin-out company (GU), Lynkeos Technology Ltd, formed 2016.
- IEEE Plasma Science and Applications Award (PSAC) 2017 – Alan Phelps (SU)

Significant grant funding:

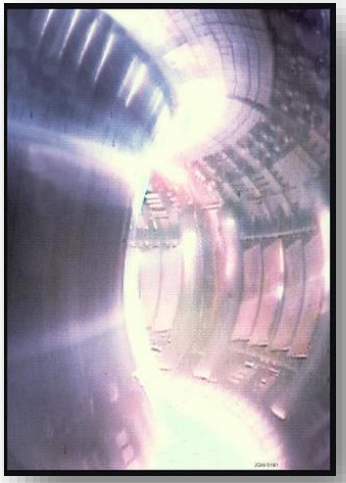
- Lynkeos (GU) won a £1.5m award from Innovate UK, to deploy a muon detector at one of NNL's locations. 2016- NEW
- EPSRC Equipment: Laser-driven radiation beamlines at SCAPA – facilitates laser-plasma science (SU); £1.7M; 2017-20 -NEW
- EPSRC: Modelling of turbulence in tokamak physics (SU); £303k; 2015-18
- EPSRC: ADAS magnetic fusion (SU); £330k; 2014-17
- EPSRC: Physics relevant to advanced ignition schemes for ICF (SU) £1.4M; 2012-17



Fusion and legacy nuclear waste

High profile publications:

- *Nature Communications* 2016 – Controlling laser-accelerated protons (advanced ignition-ICF); McKenna, SU;
- *Scientific Reports* 2017 – Laser-driven THz (advanced ignition-ICF); Sheng, SU
- *Phys. Rev. Lett.* 2017 – Laser filamentation in air (advanced ignition-ICF); Sheng, SU;



Collaborations and Impact:

- Continuing engagements with JET and ITER; Collaboration and impact via Culham and RAL
- International knowledge exchange/training ADAS workshops at the leading fusion laboratories in China, Korea, Japan, Germany, France
- First Proton Fast Ignition-Fusion International Consortium experiment funded on ORION at AWE (SU-led)

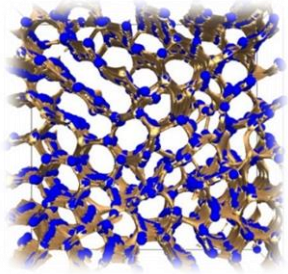
Training:

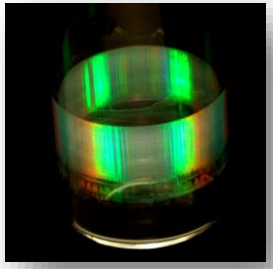
- Related Strathclyde-CDT and studentships in partnership with Culham and Central Laser Facility, RAL (SU)

Storage and Lighting

Significant new grant funding:

- EPSRC Advanced Materials for Energy Generation and Transmission grant: Multiscale tuning of interfaces and surfaces for energy applications; £2M (St.A, Edin. & partners); 2017-20 - NEW
- EPRSC TADF Emitters for OLEDs; £736k (St.A.& EastCHEM); 2017-20 - NEW
- EPSRC Equipment: Cryo-FIB-SEM-CT: a 'three-in-one' imaging facility for opaque soft matter; £1.3M (Edin.); 2017-18 - NEW
- Innovate UK, KTP; Thermal Management of Batteries for Grid Level Storage; (H-W and Dukosi Ltd); £147k; 2016-18 - NEW
- Innovate UK, KTP; The integration of Sunamp Heat Batteries with Solar Thermal Panels to develop on-demand heat supply solution; (H-W); £226k; 2016-18 - NEW
- EPSRC: Vacancy-Rich Silicon as a Flexible Thermoelectric Material - Thermoelectric generators harvesting heat to create electrical power; (H-W); £203k; 2016-18 - NEW
- EPSRC: Centre for Energy Systems Integration (Newcastle led, partners include H-W); £5M; 2016-21 - NEW
- New metrology for PV performance at low light levels – equipment at UWS

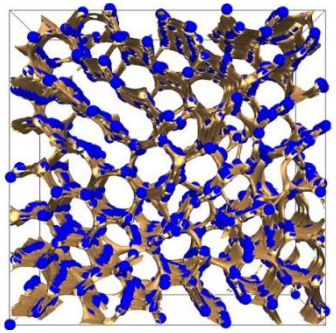




Storage and Lighting

Publications:

- *Fuel* 2016 - Comparison of Raman and IR spectroscopy for quantitative analysis of gasoline/ethanol blends (McGloin, DU)
- *Sustainability* 2016 - A Prototype Energy Autonomous Laboratory (Reynolds, DU)
- *Renewable Energy* 2016 - Micro/small wind turbine power control for electrolysis applications (Reynolds, DU)



New facilities enabling SUPA Energy research

A new clean room at St. Andrews houses advanced nanofabrication facilities, enabling the development of new electronic and photonic materials and devices.

The new SCAPA high power laser laboratories at Strathclyde house state-of-the-art lasers for research into radiation generation and plasma physics underpinning fusion

ETP Directorate

ETP is an alliance of 12 independent Scottish Universities, engaged in world class energy related Research, Development and Demonstration (RD&D).
It is the largest power and energy research partnership in Europe.

Paul McKenna represents SUPA Energy on the ETP Directorate as of May 2016. Aim: to explore opportunities to grow collaboration between Scottish Physics and Engineering in energy research

- Involved in the organisation of the Energy Innovation Emporium at Strathclyde on 31st May 2017. SUPA Energy will exhibit
- Input to Scottish Government Energy consultation

Summary

- Significant new grant funding and grow in activity across our energy research activities
- High impact publications across our theme topics
- Collaborative work across SUPA in solar, lighting and nuclear; Links to several international projects and networks
- Strong links to the EastCHEM, WestCHEM and SISER research pools
- Building new links to SMEs; Engagement with large fusion projects
- Building links with the Energy Technology Partnership