SUPA Physics Scotland

SUPA IAC Meeting – 26th May 2016

Condensed Matter and Materials Physics

Theme Leader: Brendon Lovett (since 2014)

Key points regarding Theme:

Largest Activities: Edinburgh, Glasgow, St Andrews, Strathclyde

Significant CM Presence: Dundee, Aberdeen, Heriot Watt

Related CDTs: ***: EPSRC Scottish Doctoral Training Centre in Condensed Matter Physics (Edinburgh, Heriot-Watt, St Andrews)***

Facilities: Ultra-low-vibration lab, cleanroom, and oxide MBE facility (St Andrews); CSEC high-pressure labs (Edinburgh); MagTEM (Glasgow);…

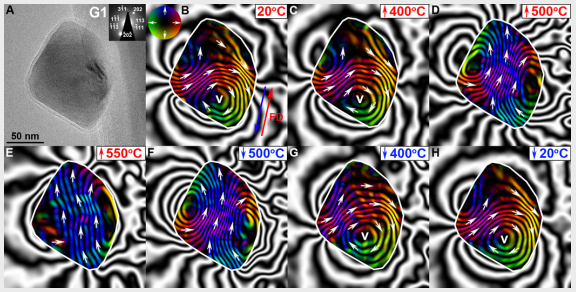
Existing Scope of Theme

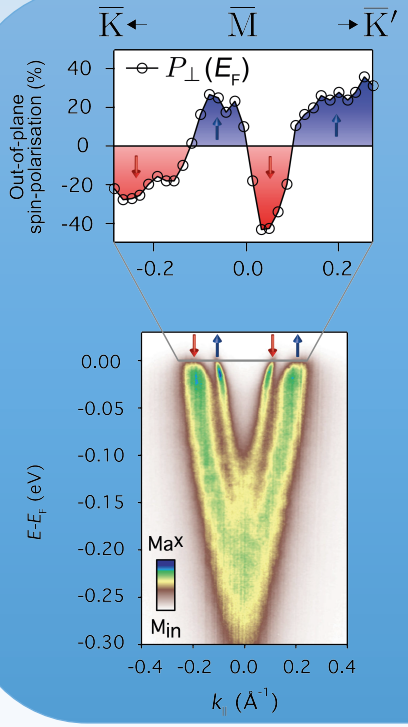
- Correlated systems, novel phases of matter, advanced quantum materials (mainly St Andrews/Edinburgh some Aberdeen?)
- Soft Matter (Edinburgh)
- Nanomaterials and Quantum Information (Heriot Watt/St Andrews)
- Microscopy for functional materials (Glasgow/Strathclyde)
- Optoelectronic devices (St Andrews/Glasgow/Strathclyde)

Illustrative Examples

(Glasgow) Direct visualization of thermomagnetic behavior: magnetite particles

T P Almeida et al, Science Advances 2, e1501801 (2016)



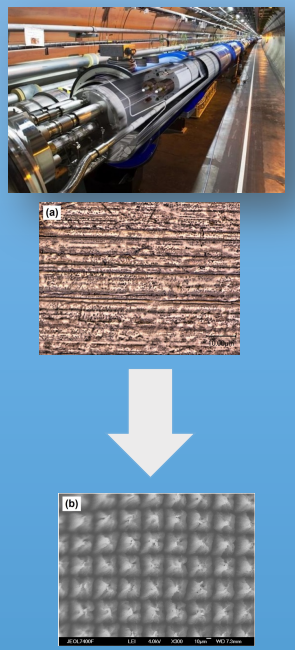


(St Andrews) Spin- and angle-resolved photoemission reveals spin-polarised Fermi surfaces of $NbSe_2$.

Nature Commun. in press (2016); arXiv: 1603.05207

(Dundee) Using lasers to reduce electron emission from surfaces in particle accelerators.

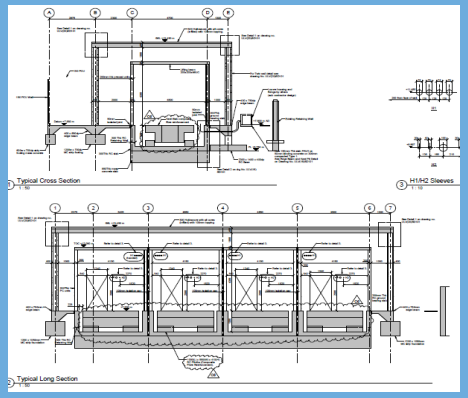
Ongoing work – nice example of possible interaction with external larger facilities



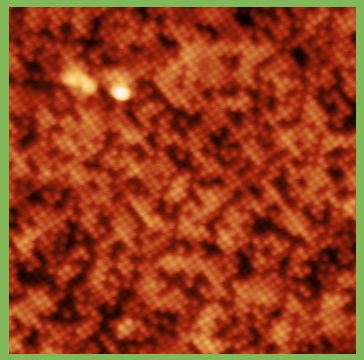
Recent Key Developments

(St Andrews) Ultra-Low Vibration Labs for Electron Microscopy

Planning

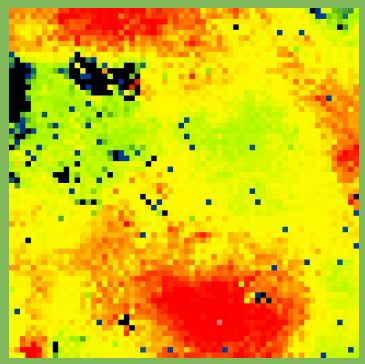


Execution



Excellent Science

Sci. Adv. 1 1500206 (2016)



Potential Areas for Development

- **Quantum materials foundry.** (How would it fit with what we have already? Who would be involved? Where would we put it?)
- **Cross-HEI theoretical physics meetings** – e.g. Matrix Product States (current interest at St Andrews, Heriot-Watt, Edinburgh, and maybe elsewhere – Strathclyde? Glasgow?)
- Development of '**Non-Equilibrium Physics**' theme.
- **SUPA theory institute**. (Kavli money? How would this interface with the Higgs Centre?)
- Future of **condensed matter CDT**.

Concluding Remarks

- **Theme is in healthy state, but**
- **You get what you pay for.** Lack of money shouldn't force us to try and do things on the cheap; instead, we will encourage groups to collaborate in bids for large external funds.