

3208 Holiday Dr. Apt. 30, Lansing, MI 48912, USA  
Stansmore House, New Road, Alton, ST10 4AF, UK

## *Work Experience and Education*

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**2017 - Ongoing, Marie Skłodowska-Curie Global Fellow.**

**Michigan State University, Birge Group**

**University of Leeds, Condensed Matter Group**

Grant title: “SUPERSPIN”

Supervisors: Prof. N. O. Birge and Dr. G. Burnell

**2016 - 2017, PDRA.** EPSRC funded post-doctoral position.

**ISIS Neutron and Muon Source, Nano-Magnetism Group**

Project title: “Generation, Imaging and Control of Novel Coherent Electronic States in Artificial Ferromagnetic-Superconducting Hybrid Metamaterials and Devices”

Supervisors: Dr. C. J. Kinane and Prof. S. Langridge

**2012 - 2016, PhD Physics.** Funding from JEOL Europe and ISIS Neutron and Muon Source.

**University of Leeds, Condensed Matter Group**

Thesis title: “Hybrid Superconducting/Ferromagnetic Thin Films for Super-Spintronics”

Supervisors: Dr. G. Burnell (Leeds) and Prof. S. Langridge (ISIS Neutron and Muon Source)

**2008 - 2012, MPhys BSc Physics.**

**University of Leeds (2:1 Honours)**

Masters Thesis title: “Magneto-Transport through Nanomagnets Embedded in an Insulator”

Supervisor: Prof. C. H. Marrows

**A Levels & GCSE.**

**St Columba's College, St Albans**

3A Grades in Mathematics, Physics and Religious Studies (A in AS Level English)

9 GCSE Grade A\* - C (including Mathematics, English and Double Science)

## *Successful Funding Applications*

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In 2017 I was awarded a prestigious 3 year Marie Skłodowska-Curie Global Fellowship titled “SUPERSPIN”. I detailed the work packages, wrote the grant application, and coordinated the submission. The grant begun in June 2017 and was worth over 250 000 EUR.

I was a co-investigator on successfully funded beamtime proposals to use PNR,  $\mu$ SR, SANS and XMCD at multiple facilities. In addition I was the principal investigator on two accepted proposals (5 days and 6 days respectively with a total value over 100 000 GBP) to perform PNR at the ISIS Neutron and Muon Source, where I designed the experiments and wrote the applications. The most recent proposal was a “highly rated proposal” by the review panel.

## Research Experience

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- **Thin film growth:**

Epitaxial and polycrystalline metals by DC sputter deposition  
Metallic alloys by co-deposition  
Oxides and nitrides by RF and reactive sputter deposition  
Additional experience in thermal and electron beam evaporation

- **Cleanroom fabrication:**

Nano-patterning of devices for transport measurements using JEOL 6300FS electron beam lithography (EBL) system  
Photolithography  
Ion beam milling

- **Large scale facility techniques:**

Polarized neutron reflectometry (PNR) at the ILL (France) and ISIS (UK)  
Low energy muon spin resonance ( $\mu$ SR) at PSI (Switzerland)  
Small angle neutron scattering (SANS) at PSI and the ILL  
Associated data processing and fitting

- **Other characterisation techniques:**

Low temperature electrical transport on thin film superconductors in  $^3\text{He}$  and  $^4\text{He}$  systems in high magnetic fields  
X-ray reflectometry and diffraction  
Magnetometry (SQUID, VSM, MOKE)  
Atomic force microscopy (AFM)

## Academic Experience

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### Teaching

Tutorial leader for MPhys level superconductivity students. Demonstrator for first year undergraduate laboratory practicals for a variety of experiments. I also mentor a number of undergraduate project students and PhD students, helping to train and supervise them in the research laboratories.

### Outreach

I am a member of the Science Theater group at MSU. I have classroom experience of running physics demonstrations for middle and high school students. I have led magnetism and superconductivity demonstrations for 6<sup>th</sup> form students when they visit the university for open days. I provide tours of the research facilities to prospective students and have organised a practical lithography session for young people on a nanotechnology summer school.

### Collaborative Work

As my publication record shows, I am consistently successful in contributing to collaborative projects. My PhD work formed a part of an EPSRC Critical Mass project between 5 UK universities. As a postdoc I forged my own national and international collaborations, leading to the award of grants and beamtimes where I am the principle investigator.

### Laboratory Management

I take responsibility for the training of new users on equipment, including sputter systems, x-ray diffractometers, cryostats and cleanroom techniques. This includes helping to optimise their measurements and aiding in data interpretation. I also regularly undertake equipment maintenance as needed. As a PhD student, I oversaw a major upgrade on a cryostat for low temperature, high field transport measurements.

## Publications

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★ Denotes lead authorship or highlighted publication.

★ “Supercurrent in ferromagnetic Josephson junctions with heavy metal interlayers” N. Satchell and N. O. Birge *Phys. Rev. B* **97**, 214509 (2018)

- “Observation of anomalous Meissner screening in Cu/Nb and Cu/Nb/Co thin films” M. G. Flokstra, R. Stewart, N. Satchell, G. Burnell, H. Luetkens, A. Suter, T. Prokscha, E. Morenzoni, S. Langridge, and S. L. Lee *Phys. Rev. Lett.* **120**, 247001 (2018) (Editors’ Suggestion)
- “Continuously tuneable critical current in superconductor-ferromagnet multilayers” P. J. Curran, J. Kim, N. Satchell, G. Burnell, M. G. Flokstra, S. L. Lee, and S. J. Bending *App. Phys. Lett.* **111**, 262601 (2017)
- ★ “Control of superconductivity with a single ferromagnetic layer in Nb/Er bilayers” N. Satchell, J. D. S. Witt, M. G. Flokstra, S. L. Lee, J. F. K. Cooper, C. J. Kinane, S. Langridge, and G. Burnell *Phys. Rev. Applied* **7**, 044031 (2017)
- “Reconfigurable superconducting vortex pinning potential for magnetic disks in hybrid structures” E. Marchiori, P. J. Curran, J. Kim, N. Satchell, G. Burnell, and S. J. Bending *Sci. Rep.* **7**, 45182 (2017)
- ★ “Probing the spiral magnetic phase in 6 nm textured erbium using polarised neutron reflectometry” N. Satchell, J. D. S. Witt, G. Burnell, P. J. Curran, C. J. Kinane, T. R. Charlton, S. Langridge, and J. F. K. Cooper *J. Phys. Condens. Matter* **29**, 055801 (2017)
- “Magnetic phases of sputter deposited thin-film erbium” J. D. S. Witt, J. F. K. Cooper, N. Satchell, C. J. Kinane, P. J. Curran, S. Langridge, L. J. Heyderman, and G. Burnell *Sci. Rep.* **6**, 39021 (2016)
- ★ “Remotely induced magnetism in a normal metal using a superconducting spin-valve” M. G. Flokstra, N. Satchell, J. Kim, G. Burnell, S. J. Bending, P. J. Curran, S. Langridge, C. J. Kinane, J. F. K. Cooper, M. Eschrig, A. Isidori, N. Pugach, H. Luetkens, T. Prokscha, and S. L. Lee *Nat. Phys.* **12**, 57-61 (2016)
- “Irreversible magnetization switching at the onset of superconductivity in a superconductor ferromagnet hybrid” P. J. Curran, J. Kim, N. Satchell, G. Burnell, M. G. Flokstra, S. L. Lee, J. F. K. Cooper, C. J. Kinane, S. Langridge, A. Isidori, N. Pugach, M. Eschrig, and S. J. Bending *App. Phys. Lett.* **107**, 262602 (2015)
- “Controlled suppression of superconductivity by the generation of polarized Cooper pairs in spin-valve structures” M. G. Flokstra, T. C. Cunningham, J. Kim, N. Satchell, G. Burnell, P. J. Curran, S. J. Bending, C. J. Kinane, J. F. K. Cooper, S. Langridge, A. Isidori, N. Pugach, M. Eschrig, and S. L. Lee *Phys. Rev. B* **91**, 060501(R) (2015) (Editors’ Suggestion)
- ★ “Studying the structural and magnetic properties of textured thin film erbium by reflectometry and diffraction of x-rays and (polarized) neutrons” N. Satchell, C. J. Kinane, J. F. K. Cooper, G. Stenning, T. R. Charlton, J. D. S. Witt, M. Batley, G. Burnell, P. J. Curran, S. J. Bending, and S. Langridge *Submitted to J. Vis. Exp. (JoVE)*

## ***Invited Talks***

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- Symposium on Spin, Coherence, and Topology, Royal Holloway University, Jun. 2016
- Department of Materials Science and Metallurgy, University of Cambridge, Jan. 2016
- School of Electronic and Electrical Engineering, University of Leeds, Aug. 2015
- Superconductor Ferromagnetic Metamaterials Annual Review, St. Andrews University, Oct. 2013

## ***Conference Presentations (Oral)***

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- International Colloquium on Magnetic Films and Surfaces (ICMFS), Santa Cruz, USA, July 2018
- International Conference on Superconductivity and Magnetism (ICSM), Antalya, Turkey, May 2018
- American Physical Society (APS) March Meeting, Los Angeles, USA, Mar. 2018
- American Physical Society (APS) March Meeting, New Orleans, USA, Mar. 2017
- Magnetism and Magnetic Materials (MMM), New Orleans, USA, Nov. 2016 \*

- International Conference on Superconductivity and Magnetism (ICSM), Fethiye, Turkey, Apr. 2016
- American Physical Society (APS) March Meeting, Baltimore, USA, Mar. 2016
- Magnetism and Magnetic Materials (MMM), Honolulu, Hawaii, USA, Nov. 2014
- Cold Atoms and Magnetism Conference (CAMACon), University of Birmingham, Jul. 2014

\* I chaired the ‘Superconductivity and Critical Phenomena’ session at this conference.

## *Conference Presentations (Poster)*

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- Exotic New States in Superconducting Devices: the Age of the Interface, Mainz, Germany, Sept. 2017
- Institute of Physics, Magnetism 2017, University of York, Mar. 2017 <sup>†</sup>
- Institute of Physics, Magnetism 2015, University of Leeds, Mar. 2015
- International Conference on Superconductivity and Magnetism (ICSM), Antalya, Turkey, May 2014
- Institute of Physics, Magnetism 2014, University of Manchester, Apr. 2014
- Physics and Astronomy Postgraduate Symposium, University of Leeds, Apr. 2014
- PSI Summer School on Condensed Matter Research, Zuz, Switzerland, Aug. 2013

<sup>†</sup> My poster was awarded the poster prize at this conference.

## *Additional Experience*

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### **Conference Organising Committee Chairman**

#### **2012 - 2013 Brightlights Festival, Aylesford**

I led the organising committee for an international conference of 1000 attendees.

June, 2018