Condensed Matter and Quantum Materials 2025

24–27 June 2025
University of Bristol, Bristol, UK

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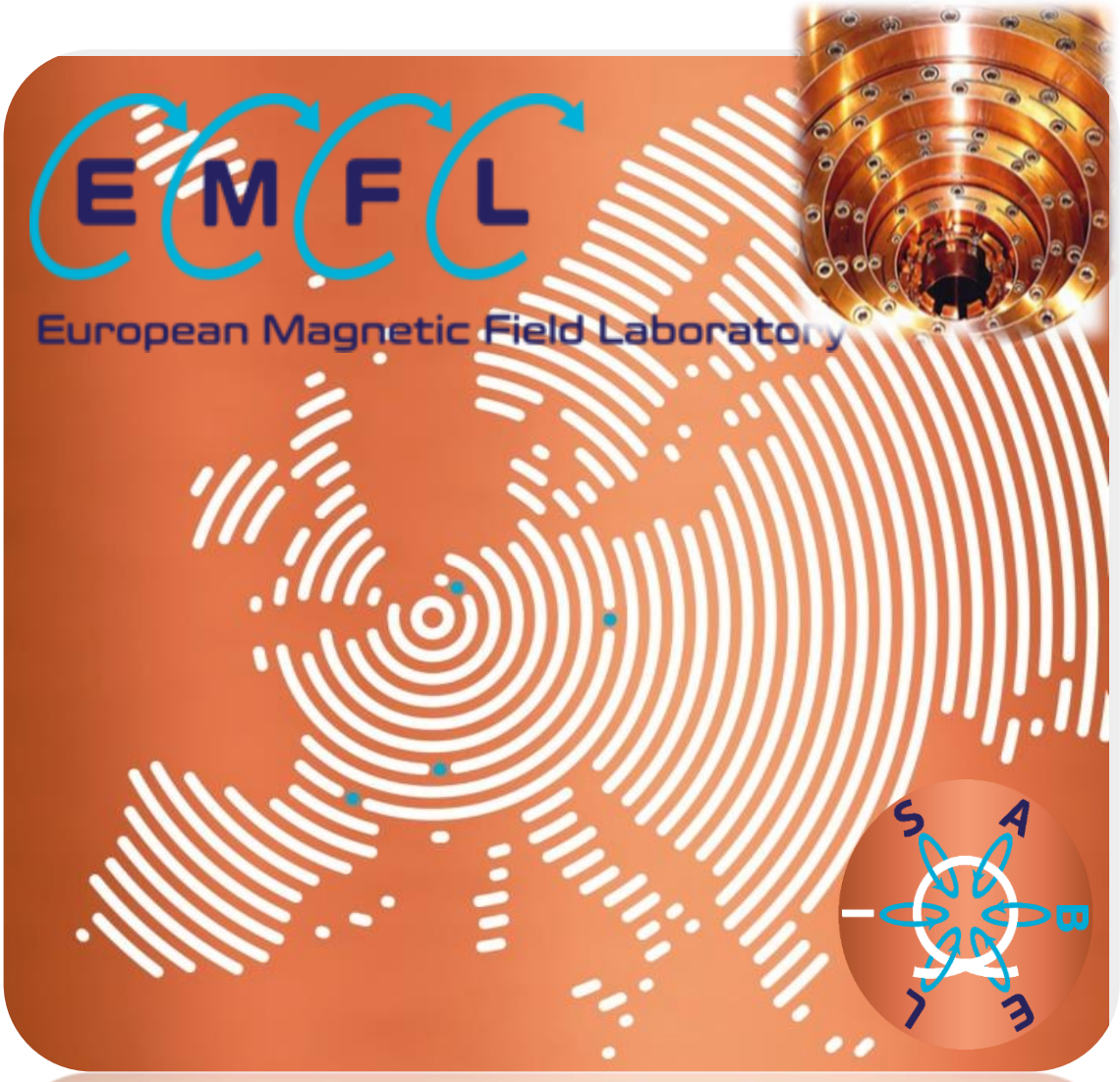

UK Partnership of the EMFL supported by the EPSRC and the EU project ISABEL

Prof. Amalia Patanè
Director of the UK Partnership of the EMFL
University of Nottingham
amalia.patane@nottingham.ac.uk

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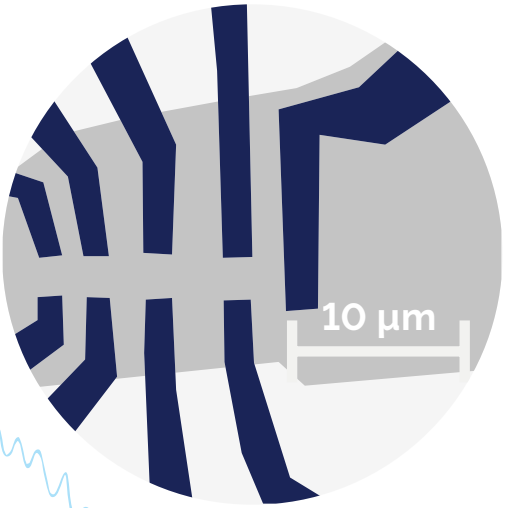

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Programme: Tuesday 24 June 2025

8:00 AM - 8:45 AM	**Registration and Arrival Refreshments**
8:45 AM - 9:00 AM	**Welcome by Sven Friedemann**, University of Bristol, UK (Room: B.H05. Sponsored by Kiutra)
9:00 AM - 10:00 AM	**Plenary Speaker: Christopher Marrows**, University of Leeds, UK Session Chair: Chris Bell (Room: B.H05. Sponsored by Kiutra) Skyrmions in chiral magnetic multilayers
10:00 AM - 10:30 AM	**Morning Break**
10:30 AM - 12:50 PM	**Superconductivity I (IOP SC Group)** Session Chair: Simon Bending (Room: B.H05. Sponsored by Kiutra) **10:30 AM - 11:00 AM Sun-Woo Kim (Invited Speaker):** Predictive Modeling of Superconductors: From High-Pressure Hydrides to Nickelates **11:00 AM - 11:20 AM Harry Morgan:** Understanding quantum materials through chemical bonding models **11:20 AM - 11:40 PM Andreas Rost:** Superconducting phases of CeRh2As2 in clean microcrystals **11:40 AM - 12:00 PM Thomas Sheerin:** Higher-harmonic superconductivity driven by van Hove singularities in the third-nearest-neighbour square-lattice Hubbard model **12:00 PM - 12:05 PM Andreas Rost:** IOP Superconductivity Thesis Prize Introduction **12:05 PM - 12:35 PM Sam Cross (IOP Superconductivity Thesis Prize Talk):** High-temperature superconductivity in thin-film metal hydrides at megabar pressures
	Magnetism Session Chair: Rhea Stewart (Room: LT2) **10:30 AM - 11:00 AM Peter Wadley (Invited Speaker):** Altermagnetism imaged and controlled down to the nanoscale **11:00 AM - 11:20 AM Habib Rostami:** Collective Excitations in Altermagnets: A Fermi Liquid Approach **11:20 AM - 11:40 AM Clifford Hicks:** Triangular antiferromagnetism under uniaxial stress: a study of PdCrO2 **11:40 AM - 12:00 PM George Wood:** A Magnon Band Analysis of GdRu2Si2 in the Field-Polarised State **12:00 PM - 12:20 PM Leonie Woodland:** From continuum excitations to sharp magnons via transverse magnetic field in the spin-1/2 Ising-like triangular lattice antiferromagnet Na2BaCo(PO4)2 **12:20 PM - 12:50 PM Andreas Kreisel (Invited Speaker):** Minimal Models for Altermagnetism: Mechanisms and experimental consequences

	Nanoscale and 2D Session Chair: Roman Gorbachev (Room: G.H01) **10:30 AM - 11:00 AM Graham Baker (Invited Speaker):** Size-restricted magneto-transport in $PdCoO_2$ **11:00 AM - 11:20 AM Joshua Coop:** Manipulating quantum states in multi-gated 1D systems **11:20 AM - 11:40 AM Vivek Kumar:** Investigation of correlation effects mediated by impurity in a one-dimensional quantum wire via dc source-drain bias spectroscopy **11:40 AM - 12:00 PM Yingshi Duo:** Quantised conductance in one-dimensional quantum wires **12:00 PM - 12:20 PM Elisabeth Bancroft:** On-surface bottom-up growth of graphene nanoribbons on SiO2 **12:20 PM - 12:50 PM Henry Legg (Invited Speaker):** Can we build a topological qubit in 2025?
12:50 PM - 2:15 PM	**Lunch**
2:15 PM - 4:05 PM	**Spin-Orbit** Session Chair: Radu Coldea (Room: B.H05. Sponsored by Kiutra) **2:15 PM - 2:45 PM Aleksandra Krajewska (Invited Speaker):** Spin-orbital phases in 4d pyrochlore oxides **2:45 PM - 3:05 PM Daniel Prestwood:** Spintronic Kapitza pendulum: dynamical stability by spin transfer **3:05 PM - 3:25 PM Thomas Saunderson:** Orbital Rashba induced triplet superconductivity in elemental superconductors **3:25 PM - 3:45 PM Thomas Robinson:** A Low Energy uSR study of proximity superconductivity in a high spin orbit coupling semiconductor 2DEG **3:45 PM - 4:05 PM Charlie Freeman:** Tunable Ultra-Strong Magnon-Magnon Coupling Approaching the Deep-Strong Regime in a van der Waals Antiferromagnet
	2D Materials and Toplogical Devices Session Chair: Henry Legg (Room: LT2) **2:15 PM - 2:45** PM **Roman Gorbachev (Invited Speaker):** Ultraclean van der Waals Heterostructures **2:45 PM - 3:05 PM Benjamin Dewes:** Scalable two-dimensional semiconductors: From photo-gating to deep UV optoelectronics **3:05 PM - 3:25 PM Joshua Thompson:** Enhancing optoelectronic devices with exciton topology **3:25 PM - 3:45 PM Amalia Patane:** Fast Ultraviolet-C Photonics: Sensing Laser Pulses on Femtosecond Timescales **3:45 PM - 4:05 PM Soumya Sarkar:** Ultraclean contacts for two-dimensional spintronic and ferroelectric memory devices

	Strongly Correlated Materials Session Chair: Lev Levitin (Room: G.H01) **2:15 PM - 2:45 PM Igor Markovic (Invited Speaker):** Electronic response to a current-induced insulator-to-metal transition in Ca2Ru04 **2:45 PM - 3:05 PM Alexandre Chaduteau:** Momentum-space modulated symmetries in the Chiral Luttinger liquid **3:05 PM - 3:25 PM Seohyun Kong:** Extracting Topological Information from the Interface Green's Function **3:25 PM - 3:45 PM Mingee Chung:** Magnetised Haldane Chain **3:45 PM - 4:05 PM Chris Bell:** Physics and materials science of elemental uranium thin films and alloys
4:05 PM - 4:30 PM	**Afternoon Break**
4:30 PM - 5:30 PM	**Plenary Speaker: Lilia Boeri**, Sapienza Università di Roma, Italy Session Chair: Andreas Rost (Room: B.H05. Sponsored by Kiutra) Pressure-quenching as a practical strategy to design new high-Tc conventional superconductors
5:30 PM - 7:30 PM	**Poster Session, Exhibition, Drinks Reception and Buffet**

Programme: Wednesday 25 June 2025

9:00 AM - 10:00 AM	**Plenary Speaker: Philip King**, University of St Andrews, UK (sponsored by M4QN) Session Chair: Olga Kazakova (Room: B.H05. Sponsored by Kiutra) Probing and controlling collective states of 2D quantum materials
10:00 AM - 10:30 AM	**Morning Break**
10:30 AM - 12:50 PM	**M4QN I** Session Chair: Olga Kazakova (Room: B.H05. Sponsored by Kiutra) **10:30 AM - 11:00 AM Neil Curson (Invited Speaker):** Fabrication of atomic-scale devices in silicon for quantum computing **11:00 AM - 11:30 AM Frank Schindler (Invited Speaker):** Topological excitons in 1D **11:30 AM - 12:00 PM Chiara Ciccarelli (Invited Speaker):** Extracting spin from compensated magnets at picosecond timescales **12:00 PM - 12:20 PM Demininggus Pekei:** High Sensitivity Broadband Fibre-Integrated Waveguide Magnetometry in Diamond **12:20 PM - 12:40 PM Ella Mann-andrews:** An emerging security technology: using quantum dots to produce Optical Physically Unclonable Functions
	Statistical and Nonlinear Session Chair: Nigel Wilding (Room: LT2) **10:30 AM - 11:00 AM Alice Thorneywork (Invited Speaker):** As simple as one, two three? Probing self and collective dynamics by counting colloids **11:00 AM - 11:20 AM Michael Faulkner:** Breaking symmetry to save symmetry with rejection-free Monte Carlo **11:20 AM - 11:40 AM Hubert Naguszewski:** Optimal parallelisation strategies for flat histogram Monte Carlo sampling **11:40 AM - 12:00 PM David Martin:** Semiclassical Trace Formula for Lieb-Liniger Model **12:00 PM - 12:20 PM Alexis Darras:** Competing aggregation and iso-density equilibrium lead to band patterns in density gradients **12:20 PM - 12:50 PM Dwaipayan Chakrabarti (Invited Speaker):** Programming Self-Assembly for Colloidal Photonic Crystals

	Computational Physics Session Chair: James Annett (Room: G.H01) **10:30 AM - 11:00 AM Gesa-Roxanne Siemann (Invited Speaker):** Understanding the ultrafast electron dynamics and CDW transition in LaTe3 using machine learning **11:00 AM - 11:20 AM Christopher Woodgate:** Crystallographic orderings in the AlTiVNb and AlTiCrMo refractory high-entropy superalloys: first-principles theory and atomistic simulations **11:20 AM - 11:40 AM Sam Harley:** Variational Autoencoder Representation Learning for Break-Junction Data Analysis **11:40 AM - 12:00 PM Adam Fisher:** What a drag: computational investigation of highly sluggish diffusion in Fe-Ni alloys **12:00 PM - 12:30 PM Laura Ratcliff (Invited Speaker):** Exploring Disorder using Density Functional Theory and X-ray Photoelectron Spectroscopy
12:50 PM - 2:15 PM	Lunch
2:15 PM - 4:05 PM	**M4QN II** Session Chair: Neil Curzon (Room: B.H05. Sponsored by Kiutra) **2:15 PM - 2:45 PM Christoforos Moutafis (Invited Speaker):** Towards Skyrmionic Artificial Synapses for Neural Network Hardware **2:45 PM - 3:15 PM Christina Psaroudaki (Invited Speaker):** Harnessing Chirality: Skyrmions as a New Frontier for Quantum Computing **3:15 PM - 3:45 PM Leon Ross (Invited Speaker):** Silicon qubits fabricated using industrial 300mm wafer processes **3:45 PM - 4:05 PM Joseph Prentice:** Understanding environmental effects on crystalline defects for quantum technology
	2D Materials Session Chair: Amalia Patane (Room: LT2) **2:15 PM - 2:45 PM Pengcheng Dai (Invited Speaker):** Room temperature spin nematic phase and anomalous Hall effect in tetragonal lattice AMnBi2 (A = Ca, Yb) **2:45 PM - 3:05 PM Bruno Saika:** Electronic structure and charge-density wave modulation in monolayer TiSe2 **3:05 PM - 3:25 PM Luke Rhodes:** Probing moiré electronic structures through quasiparticle interference **3:25 PM - 3:45 PM David Perkins:** Topological Singularities in Twisted Kagome Bilayers **3:45 PM - 4:05 PM James Wilson:** Investigation of magnetic field-induced quantum transport phenomena in tungsten ditelluride

	Thin-Films Session Chair: Chiara Ciccarelli (Room: G.H01) **2:15 PM - 2:45 PM Rhea Stewart (Invited Speaker):** Characterising superconducting proximity effects using low energy muon spin spectroscopy **2:45 PM - 3:05 PM Charlie Wells:** Changing the Seebeck Coefficient Polarity of a Self-Assembled Monolayer by Surface Interaction **3:05 PM - 3:25 PM Richa Arjariya:** Improving the stability of thin films for molecular electronics through on-surface cross-linking **3:25 PM - 3:45 PM James Newson:** Enhancing the thermoelectric performance of molecular layers via π-π stacking **3:45 PM - 4:05 PM Nilanthy Balakrishnan:** A comprehensive study on the multi-band emission of zinc sulfide thin film grown by aerosol-assisted chemical vapour deposition
4:05 PM - 4:30 PM	**Afternoon Break** **Healthy snacks provided and sponsored by M4QN**
4:30 PM - 5:30 PM	**Plenary Speaker: Juan P Garrahan**, University of Nottingham, UK Session Chair: Francesco Turci (Room: B.H05. Sponsored by Kiutra) Circuits as a simple platform for the emergence of hydrodynamics in many-body systems
5:30 PM - 7:00 PM	**Evening Lecture: Steve Simon**, University of Oxford, UK Anyons: New Types of Particles in Quantum Physics Powell Lecture Theatre, School of Physics Building, Tyndall Avenue, Bristol, BS8 1TL

Programme: Thursday 26 June 2025

9:00 AM - 10:00 AM	**Plenary Speaker: Susan Speller**, University of Oxford, UK Session Chair: Antony Carrington (Room: B.H05. Sponsored by Kiutra) Radiation damage of high temperature superconductors for fusion magnets
10:00 AM - 10:30 AM	**Morning Break**
10:30 AM - 12:50 PM	**Unconventional Superconductivity** Session Chair: Shuqiu Wang (Room: B.H05. Sponsored by Kiutra) **10:30 AM - 11:00 AM Lucia Iglesias Bernardo (Invited Speaker)**: Democratizing nickelates superconductors: Topotactic reduction induced by aluminum sputter deposition **11:00 AM - 11:20 AM LV Levitin**: Identification of topological superconductivity in antiferromagnetic heavy-fermion metal YbRh2Si2 **11:20 AM - 11:40 AM Simon Bending**: Magnetically-controlled Vortex Dynamics in a Ferromagnetic Superconductor **11:40 AM - 12:00 PM Andreas Kreisel**: Quasiparticle Interference of Spin-Triplet Superconductors: Application to UTe2 **12:00 PM - 12:20 PM Joseph Carroll**: Imaging Odd-Parity Quasiparticle Interference in the Superconductive Surface State of UTe2 **12:20 PM - 12:50 PM Brian Møller Andersen (Invited Speaker)**: Theory of superconducting pairing and topological surface states in UTe2
	Non-equilibrium Session Chair: Stephen Clark (Room: LT2) **10:30 AM - 11:00 AM Katarzyna Macieszczak (Invited Speaker)**: Gauge freedoms in unravelled quantum dynamics: How do different continuous measurements yield identical quantum trajectories and what does it mean for their symmetries? **11:00 AM - 11:20 AM David Strachan**: Non-Markovian Quantum Mpemba Effect **11:20 AM - 11:40 AM Enrico Da Como**: Coherent phonon dynamics in two-dimensional charge density wave materials **11:40 AM - 12:00 PM Alvaro Lanza**: Estimating Entropy from Coarse-grained Single-molecule Statistics in Langevin Systems **12:00 PM - 12:20 PM Alessandro Romito**: Theory of free fermions dynamics under partial post-selected monitoring **12:20 PM - 12:50 PM Halim Kusumaatmaja (Invited Speaker)**: Harnessing Complex Interfacial Flow Dynamics for Structuring Soft Materials

	Facilities for CMQM (10:30am to 12:30pm) Session Chair: Nigel Hussey (Room: G.H01) **10:30 AM - 11:00 AM David LeBeouf (Invited Speaker):** Advancements in magnet technologies for condensed matter physics at EMFL **11:00 AM - 11:30 AM Matthew Watson (Invited Speaker):** Excelling in Photoemission Spectroscopy at Diamond Light Source **11:30 AM - 12:00 PM Sanghamitra Mukhopadhyay (Invited Speaker): Condensed** Matter and Quantum Materials Research at ISIS Neutron and Muon Source **12:00 PM - 12:30 PM Amalia Patane (Invited Speaker):** Magnificent Magnetic Fields
12:30 PM - 1:00 PM	**Lunch Discussion: Future Directions of Facilities** (Room: G.H04)
12:50 PM - 2:15 PM	**Lunch**
2:15 PM - 4:05 PM	**Strongly Correlated Electron Systems** Session Chair: Chris Hooley (Room: B.H05. Sponsored by Kiutra) **2:15 PM - 2:45 PM Zlatko Papic (Invited Speaker):** Fingerprints of composite fermion Lambda levels in scanning tunneling microscopy **2:45 PM - 3:05 PM Peter Wahl:** Emergent exchange-driven giant magnetoelastic coupling in a correlated itinerant ferromagnet **3:05 PM - 3:25 PM Jacopo Radaelli:** Critical spin fluctuations and strange metal behaviour in La2-xSrxCuO4 **3:25 PM - 3:45 PM Mengke Ha:** Time-Reversal Symmetry Protected Transport at Correlated Oxide Interfaces **3:45 PM - 4:05 PM Graham Van Goffrier:** Quantum Spectral Sampling for Quantum Link Models
	Unconventional Superconductivity II Session Chair: Joseph Beturas (Room: LT2) **2:15 PM - 2:45 PM Malte Grosche (Invited Speaker):** Field-resilient superconductivity in $CeSb_2$ and UTe_2 **2:45 PM - 3:05 PM Roemer Hinlopen:** Resolving the Fermi surface and detection of anisotropic vortex pinning in FeSe **3:05 PM - 3:25 PM Amalia Coldea:** Strain-tuning of electronic structure of a tetragonal iron-chalcogenide superconductor **3:25 PM - 3:45 PM Greg Mazur:** Achieving topological superconductivity with artificial Kitaev chains **3:45 PM - 4:05 PM Kourosh Shirkoohi:** ARPES-derived anomalous spectral weight across the Fermi surface of the strange metal phase

	2D and 1D Materials Session Chair: Graham Baker (Room: G.H01) **2:15 PM - 2:45 PM Michele Pizzochero (Invited Speaker):** Unconventional π-electron magnetism in graphene nanoribbons **2:45 PM - 3:05 PM Lewis Burke:** Momentum–dark excitons & trions in systems exhibiting a Mexican-hat energy dispersion: example of InSe **3:05 PM - 3:25 PM Mugerabe Zerabza:** The folded pseudochiral Fermi surface of charge density wave material 4Hb-TaSe2 **3:25 PM - 3:45 PM Jeongmin Lee:** Physical properties of layered metal-rich chalcogenides Ta2Se and its application **3:45 PM - 4:05 PM Jan Tomczak:** Universal transport at Lifshitz metal-insulator transitions in two dimensions
4:05 PM - 4:30 PM	**Afternoon Break** **Ice-cream provided and sponsored by M4QN**
4:30 PM - 5:30 PM	**Plenary Speaker: Chris Howard**, University College London, UK Session Chair: Clifford Hicks (Room: B.H05. Sponsored by Kiutra) Studying low-dimensional materials, from fundamental research to real world impact
7:00 PM - 10:30 PM	**Conference Dinner** Sponsored by Oxford Instruments NanoScience Great Hall, Wills Memorial Building, Queens Road, Bristol, BS8 1RJ

Programme: Friday 27 June 2025

9:00 AM - 10:00 AM	**Plenary Speaker: Radu Coldea**, University of Oxford, UK Session Chair: Stephen Hayden Room: Priory Road Lecture Theatre (Sponsored by Kiutra) Quantum magnetism in the strong spin orbit regime: experimental challenges and opportunities
10:00 AM - 10:30 AM	**Morning Break** **Room: Priory Road Lecture Theatre Foyer**
10:30 AM - 12:00 PM	**Frustrated Magnetism and Spin Ice** Session Chair: George Wood (Room: Priory Road Lecture Theatre. Sponsored by Kiutra) **10:30 AM - 11:00 AM J.C. Séamus Davis:** Spinon Mediation of Witness-Spin Dynamics and Ground State in Herbertsmithite **11:00 AM - 11:20 AM Chris Hooley:** A generalised Haldane map from the matrix product state path integral to the critical theory of the J1-J2 chain **11:20 AM - 11:40 AM Adil Gangat:** Linear-time classical approximate optimization of cubic-lattice classical spin glasses **11:40 AM - 12:00 PM Henry Legg:** Determination of spin-orbit interaction via nonlinear transport
	2D and Topological Physics Session Chair: Enrico Da Como (Room: LT2) **10:30 AM - 11:00 AM Jieyi Liu:** Probe valency and magnetism of magnetic topological materials using XMCD **11:00 AM - 11:20 AM Marcin Mucha-Kruczynski:** Rhombohedral graphite junctions as physical realisations of topological defects in the Su-Schrieffer-Heeger model **11:20 AM - 11:40 AM Miguel Luque Canete**: Phonon-Limited Conductivity of Topological Surface States in Bi_2Se_3 **11:40 AM - 12:00 PM Priya Sharma:** Towards a micromechanical qubit based on quantized oscillations in superfluid helium
	Materials for Energy and Chemical physics and Self-Assembly (Room: G.H01) **10:30 AM - 11:00 AM Ziwei Wang:** Quantifying hydrogen bonding using electrically tunable nanoconfined water **11:00 AM - 11:20 AM Adyant Agrawal:** Molecular Insights into Irregular Growth of Salt Crystals: The Role of Charge and Water Structure **11:20 AM - 11:40 AM Mario Antonio Ongkiko:** Simulating 23Na NMR of sodium-ion-modified ZIF-62 glass

12:00 PM - 1:00 PM	Lunch (grab and go) Room: Student Common Room

Poster Presentations

Poster Board No.	First Name	Last Name	Organisation	Paper Title
1	Adyant	Agrawal	Institute For Computational Physics, University of Stuttgart	Negative Intrinsic Viscosity in Graphene Suspensions: Insights from Molecular Dynamics and Continuum Theory
2	Miriam	Aldis	University of Bristol	Probing the nematic quantum criticality of FeSe1-xSx
3	Sarah	Alnujaim	The University of Edinburgh	DFT+U Study of Magnetic Configurations and 5f Electron Behaviour in UAu_2
4	Felix	Baylis	University of Birmingham	Improving Strain Measurements of Highly Stressed Quantum Materials
5	Chris	Bell	University of Bristol	FaRMS: Facility for Radioactive Materials Surfaces
6	Tobias	Chatfield	Bristol University	Measuring the Variation in Zero Temperature Magnetic Penetration Depth of Cuprate Superconductors with Pressure
7	Cerys	Cooper		Improved conductance and stability in Mo_2-based self-assembled monolayers through pyridine functionalisation
8	William	Fern	University of Bath	Hall Array Magnetometry of Ferromagnetic Iron-Pnictide Superconductor EuFe2(As0.79P0.21)
9	Sam	Harley	Lancaster University	Improving the Precision of Thermoelectric Atomic Force Microscopy Measurements
10	Harriet	Howard	Oxford Instruments	Demonstrating temperature stability of a closed cycle helium-4 cryo-magnetic platform
11	Tim	Huijbregts	University of Bristol	Testing the putative Tomonaga-Luttinger liquid to Fermi liquid crossover in Li0.9Mo6O17 through Boltzmann analysis of the Hall resistivity
12	Satya	Lanka	Cardiff University	Micromagnetic modelling of Ni nanotubes with circular and elliptical cross-section
13	Oscar	Leonard	University of Bath	Vortex dynamics in thin film superconductor ratchet structures
14	Yi-hua	Lim	University of Bristol	Scanned Andreev Tunnelling Microscopy: Atomic-scale visualisation of electronic structure and symmetry in spin-triplet superconductors
15	Jaskaran Singh	Mangat	University of Warwick	Massive interstitial strain and magnetic behaviour of the nickelate series Pr2-xCaxNiO4+δ (δ >> 0, δ ≈ 0)
16	Mario Antonio	Ongkiko	University of Birmingham	Simulating 23Na NMR of sodium-ion-modified ZIF-62 glass
17	Luke	Pimlott	University of Bath	Light-Induced Interlayer Raman Forces in 2D Materials
18	Pablo	Reiser	University of Bath	Second order transport in two-dimensional electronic Fermi liquid
19	Alex	Roberts	Cardiff University	Tunability of spin texture in conformally-coated 3D nanostructured magnetic metamaterials
20	Thomas	Robinson	University of Bristol	Nanofabrication, characterisation and tuning of Nb3Cl8 via photolithography for Ionic Liquid gating:
21	Charles	Sayers	Politecnico di Milano	Electrically Tunable Femtosecond Dynamics of Excitonic Complexes in Single-Layer TMDs
22	Daniel	Skoczek	University of Bristol	Mapping Pressure to Doping in Optimally Doped YBa2Cu3O6+x
23	Arjen	van den Berg	Cardiff University	Topological Solitons and Monopolar Fields in a 3D Artificial Spin-Ice
24	Bruce	Weaver	Rutherford Appleton Laboratory	100 kHz Repetition Rate Extreme Ultraviolet Beamlines at the Artemis Facility