CMQM 2023

Condensed Matter and Quantum Materials

28–30 June 2023

University of Birmingham, Birmingham, UK

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Condensed Matter and Quantum Materials (CMQM 2023)

Programme

Wednesday 28 June 2023
Bramwell Foyer, Bramwell Music Building

5pm – 7pm	Registration and Drinks Reception

Thursday 29 June 2023
The Teaching and Learning Building

8:15am - 9am	Registration and Arrival Refreshments
9am - 9:30am	**Plenary Session 1. Room: Theatre 1 (Upper Ground Floor)** **David Cobden:** Topology, superconductivity, excitons and ferroelectricity all in one place
9:30am - 10:30am	**Magnetism 1. Room: Theatre 1 (Upper Ground Floor)** **Joseph Barker** (9:30am-10am): Calculating thermodynamics, magnons and spin currents in complex magnetic materials using atomistic spin dynamics **Stephen Blundell** (10am-10:15am): The quantum muon as a probe of magnetic frustration **Dr. Manuel Dos Santos Dias** (10:15am-10:30am): Topological magnons driven by the Dzyaloshinskii-Moriya interaction in the centrosymmetric ferromagnet Mn5Ge3
	Superconductivity 1. Room: Theatre 2 (First Floor) **Dr Jake Ayres** (9:30am-10am): Magnetotransport and Dual Character of Cuprates **Wangping Ren** (10am-10:15am): On the Electron Pairing Mechanism of Copper-Oxide High Temperature Superconductivity **Charles Tam** (10:15am10:30am): Two component charge fluctuations in La2-xSrxCuO4
	Metals and Correlated Electron Systems 1. Room: 118/119 (First Floor) **Dr Andreas W. Rost** (9:30am-10am): Entropy of Quantum Materials **Shiyu Deng** (10am-10:15am): Dynamics of the critical phonon modes in quantum paraelectric $SrTiO_3$ **Mr Jacopo Radaelli** (10:15am-10:30am): Plasmons in a bilayer cuprate
	Semiconductors. Room: 109 (First Floor) **Dr Taylor Stock** (9:30am-10am): High-yield atomically precise fabrication using arsenic in silicon and germanium **Chak Lam Chan** (10am-10:15am): Site-controlled InAs/GaAs Quantum Dot arrays for nanophotonics **Patrick Williams** (10:15am-10:30am): An ab initio Study of Electron Transport in Ultra-Wide Band Gap Semiconductors
10:30am - 11am	Morning Break Sponsored by Oxford Instruments Nanoscience
11:00am - 1pm	**Helium and Complex Structured Materials. Room: Theatre 1 (Upper Ground Floor)** **Professor Neil Wilson** (11am-11:30am): Electronic structure measurements of 2D materials, with a twist **Fabrizio Cossu** (11:30am-11:45am): Structural and magnetic competition in (111)-oriented manganite superlattices **Dr Petri Heikkinen** (11:45am-12pm): Topological superfluid helium-3 under mesoscopic confinement **Dr Oleg Kirichek** (12pm-12:15pm): 4He and 3He – 4He mixture films studied by neutron reflectometry **Tineke Salmon** (12:15pm-12:30pm): QUEST-DMC: Superfluid Helium-3 Bolometers for a Direct Dark Matter Search **Liam Turnpenny** (12:30pm-12:45pm): Phase transition and Moiré superlattices in the two-dimensional single and few-layer NiI2 transition metal dihalide

11:00am - 1pm	**Superconductivity 2. Room: Theatre 2 (First Floor)** **Bernd Braunecker** (11am-11:15am): Supercurrent-enabled Andreev reflection in a chiral quantum Hall edge state **Amalia Coldea** (11:15am-11:30am): Fermi surfaces and quasiparticle effective masses in the high-pressure phase of superconducting iron-chalcogenides, FeSe1-xSx **Emily Gamblen** (11:30am-11:45am): Probing the superconducting transition in 2D materials with graphene-based SQUIDs **Archie Morfoot** (11:45am-12pm): Anisotropic band splitting induced by applied strain to a tetragonal FeSe1-xSx **Searbhán Ó Peatáin** (12pm-12:15pm): Characterization of Titanium-Nitride Thin Films & Design of Kinetic Inductance Travelling Wave Parametric Amplifier **Emil Rizvanov** (12:15pm-12:30pm): Numerical simulation of Josephson traveling-wave parametric amplifier **Rais Shaikhaidarov** (12:30pm-12:45pm): Current quantization due to the a.c. coherent quantum phase slip effect **Mr Max Taylor** (12:45pm-1pm): Fractional Shapiro steps in graphene SQUIDs
	Metals and Correlated Electron Systems 2. Room: 118/119 (First Floor) **Dr Silvia Ramos** (11am-11:30am): Structural signatures of metal-insulator transitions as seen by polarisation dependent x-ray absorption spectroscopy **Carolina De Almeida Marques** (11:30am-12pm): Enhanced surface magnetism in the ferromagnetic Sr4Ru3O10 **Prof Andrew Green** (12pm-12:30pm): The Role of Quantum Computation in Condensed Matter Physics **Michal Moravec** (12:30pm-12:45pm): Directional Ballistics in Ultra-Pure Delafossite Metals **Thomas Sheerin** (12:45pm-1pm): Non-Fermi Liquid Behaviour Induced by Gauge-Field Interactions: Insights from the Functional Renormalization Group
	Topological Materials 1. Room: 109 (First Floor) **Dirk Backes** (11am-11:15am): Evaluating and optimising proximity-induced magnetism in MnTe/Bi2Te3 heterostructures **Gabriel Cardoso** (11:15am-11:30am): Exact Results on the Anomalous Hall Effect in the Dirac Semimetal ZrTe5 **Dr Malcolm Connolly** (11:30am-11:45am): Integration of semiconductor Josephson junctions in superconducting quantum circuits **Dylan Jones** (11:45am-12pm): Flat bands, localised states, and non-trivial topology of one-dimensional Lieb superlattices **Philipp Kagerer** (12pm-12:15pm): The 2D Ferromagnetic Extension of a Topological Insulator
1pm - 2:50pm	**Lunch, Poster Session and Exhibition**
2:50pm - 3pm	**Presentation by Cryogenic. Rooms: Theatre 1 (Upper Ground Floor) and Theatre 2 (First Floor)**
3pm - 5:30pm	**Vinen Memorial Session. Room: Theatre 1 (Upper Ground Floor)** **Dr Chris Muirhead** (3pm-3:30pm): W.F. (Joe) Vinen: a brief summary of Joe's career and his many achievements **Prof Carlo Barenghi** (3:30pm-4pm): Quantum turbulence - the scientific legacy of W. F. Vinen **Professor Peter McClintock** (4pm-4:30pm): Using negative ions to measure Joe Vinen's energy barrier **JC Seamus Davis** (4:30-5pm): Quantization of Macroscopic Phenomena **Professor Ladislav Skrbek** (5pm-5:30pm): Collective dynamics of ions and vortices in He II in experiments of Joe Vinen
	M4QN Focus Session. Room: Theatre 2 (First Floor) **Thorsten Hesjedal** (3pm-3:30pm): Bringing Magnetic Order to Topological Insulators **Martin Weides** (3:30pm-4pm): Optimizing Materials in Superconducting Quantum Circuits **Dr Otto Mustonen** (4pm-4:30pm): Spin-liquid-like states in perovskite-related phases **Professor Geetha Balakrishnan** (4:30pm-5pm): Investigations of Skyrmion materials **Dr Sanjeev Kumar** (5pm-5:30pm): Fractional conductance in one-dimensional electrons
5:40pm - 6:15pm	**Evening Talk. Room: Theatre 1 (Upper Ground Floor)** Professor Carl Chinn, historian of the city of Birmingham: Talk: Making of the Modern World
6:30pm - 10:30pm	**Conference Drinks Reception and Dinner** Botanical Gardens, Westbourne Road, Birmingham, B15 3TR A bus will be operating between the University and the venue and the return journey

Friday 30 June 2023
Teaching and Learning Building

8:30am – 9am	Arrival Refreshments
9am - 9:30am	**Plenary Session 2. Room: Theatre 1 (Upper Ground Floor)** **Peter Littlewood**: Materials for energy and sustainability
9:30am-10:30am	**Magnetism 2. Room: Theatre 1 (Upper Ground Floor)** **Dr Matthew Coak** (9:30am-10am): Tuning dimensionality, magnetism and conduction in van-der-Waals Mott insulators TMPS3 **Marios Georgiou** (10am-10:15am): Multi-Q magnetic phases from frustration and chiral interactions **Jack Harrison** (10:15am-10:30am): Flexure-induced strain control of antiferromagnetic domains in crystal membranes
	Atomic, Molecular and Optical Physics. Room: Theatre 2 (First Floor) **Dr Charles Creffield** (9:30am-9:45am): Correlated superfluidity produced by Floquet driving **Angus Crookes** (9:45am-10am): Strong Coupling and Entanglement in Extreme Nanophotonic Cavities **Takla Nateeboon** (10am-10:15am): Effects of cavity and atomic decay rates on efficiencies of quantum memory **Dr Hannah Stern** (10:15am-10:30am): Coherent Control of a Single Electronic Spin in a 2D Material at Room Temperature
	Facilities 1. Room: 118/119 (First Floor) **Cephise Cacho** (9:30am-10am): Photon-based characterisations of Quantum Material at Diamond Light Source **Pascal Manuel** (10am-10:30am): New opportunities for Quantum materials research at the ISIS neutron and muon source
	Metals and Correlated Electron Systems 3. Room: 109 (First Floor) **Petra Grozić** (9:30am-9:45am): Magnetocondoctivity of CaC6 with a CDW-reconstructed Fermi surface **Larissa Ishibe Veiga** (9:45am-10am): The 3d-5d exchange interactions and orbital hybridization in Ba- and Ca-doped La2CoIrO6 double perovskite **Barbara Keran** (10am-10:15am): DC Transport and Magnetotransport Properties of the 2D Isotropic Metallic System with the Fermi Surface Reconstructed by the Charge Density Wave **Alex Louat** (10:15am-10:30am): Termination-dependent surface states and bulk band structure of LaTe2
10:30am – 11am	Morning Break Sponsored by Oxford Instruments Nanoscience
11am – 1pm	**Magnetism 3. Room: Theatre 1 (Upper Ground Floor)** **Dr Jennifer Fowlie** (11am-11:30am): Intrinsic magnetism in superconducting nickelate heterostructures **Dr Berit Goodge** (11:30am-12pm): Solving the polar interface in superconducting nickelate thin films **Dr Daniel Mayoh** (12pm-12:15pm): Magnetic properties of the intercalated transition metal dichalcogenide Fe1/3TaS2 **Dr Thomas Moore** (12:15pm-12:30pm): Separation of heating and magneto-elastic coupling effects in surface acoustic wave-enhanced magnetic domain wall creep motion **Dr Thomas Nussle** (12:30pm-12:45pm): Numerical simulations of spin dynamics using a path integral method **Wei Peng** (12:45pm-1pm): Electron skew scattering by ferroelastically frustrated magnetic spins
	Topological Materials 2. Room: Theatre 2 (First Floor) **Dr Bartomeu Monserrat** (11am-11:30am): From single to multi-gap topological materials **Sian Dutton** (11:30am-12pm): Magnetism on the stretched diamond lattice in lanthanide orthotantalates **M. M. McCarthy** (12pm-12:15pm): A topological classification of finite chiral structures – theory and experiment **Songyang Pu** (12:15pm-12:30pm): Signatures of Supersymmetry in the v=5/2 Fractional Quantum Hall Effect **Professor D.M. Whittaker** (12:30pm-12:45pm): Topological Physics in Coaxial Cable Networks **Dr Wei Wu** (12:45pm-1pm): Topological properties of a one-dimensional excitonic model combining local excitation and charge transfer

11am – 1pm	**Facilities 2. Room: 118/119 (First Floor)** **Professor Amalia Patanè** (11am-11:15am): Science and Technologies at the European Magnetic Field Laboratory **Sean Collins** (11:15am-11:30am): Probing the heterogeneity of electronic structure at the nano- to atomic-scale at SuperSTEM **Professor Roger Webb** (11:30am-11:45am): Ion Implantation for Solid State Quantum Technologies **Dr Yvonne Grunder** (11:45am-12pm): XMaS: The UK Materials Science Facility at the ESRF **Dr David Cox** (12pm-12:15pm): Deterministic Single Ion Implantation at the NIBC and the RAISIN Network **Dr Edmund Clarke** (12:15pm-12:30pm): EPSRC National Epitaxy Facility enabling semiconductor research in the UK **Dr Dinu Iuga** (12:30pm-12:45pm): High-Field Solid-State Nuclear Magnetic Resonance National Research Facility **Dr Mark Isaacs** (12:45pm-1pm): HarwellXPS – The UK National Facility for XPS; Analysis and Advances
	Surfaces, Interfaces and Thin Films. Room: 109 (First Floor) **Akhil Rajan** (11am-11:30am): Surfactant-mediated epitaxial growth of large-area transition-metal dichalcogenides **Assoc Prof Robert Edward** (11:30am-11:45am): Antimony trisulfide: from local structural transitions to programmable photonics **Edward Dunn** (11:45am12pm): Ambient characterisation of atomic defects in transition metal dichalcogenides with single atom resolution **Chris Hooley** (12pm-12:15pm): Hierarchy of Lifshitz transitions in the surface electronic structure of Sr2RuO4 under uniaxial compression **Dr Juliana Morbec** (12:15pm-12:30pm): Designing organic/2D heterostructures for photovoltaic applications **Dr Rebecca Nicholls** (12:30pm-12:45pm): Structure and Phase Transformations of Metastable Hexagonal Uranium Thin Films **Alessio Quadrelli** (12:45pm-1pm): Activation of 2D polymerisation on inert surfaces with atomic clusters as extrinsic catalysts
1pm – 3pm	**Lunch, Poster Session and Exhibition**
3pm – 5pm	**Magnetism 4. Room: Theatre 1 (Upper Ground Floor)** **Dr Sam Ladak** (3pm-3:30pm): Magnetic Charge Ordering in 3D Artificial Spin-ice **Ioannis Rousochatzakis** (3:30pm-4pm): The role of symmetric off-diagonal exchange in Kitaev honeycomb antiferromagnets **Shroya Vaidya** (4pm-4:15pm): Magnetic Ground States of Non-linear Antiferromagnetic Coordination Polymer Chains **Ieuan Wilkes** (4:15pm-4:30pm): Materials Optimisation for Next Generation Low Power Electronic Devices **George Wood** (4:30pm-4:45pm): The Double-Q Ground State with Topological Charge Stripes in the Centrosymmetric Skyrmion Candidate GdRu2Si2 **Xiaotian Zhang** (4:45pm-5pm): Magnetoelectric coupling of Terbium Tantalate
	Superconductivity 3. Room: Theatre 2 (First Floor) **Professor Andrew Huxley** (3pm-3:30pm) **Dr Sven Friedemann** (3:30 PM - 4:00 PM): High-Magnetic-Field Studies of Hydride High-Temperature Superconductors **James Annett** (4:00 PM - 4:15 PM): Modelling strain experiments in unconventional superconductors **Weijiong Chen** (4:15 PM - 4:30 PM): Interplay of Hidden Orbital Order and Superconductivity in CeCoIn5 **Morgan Grant** (4:30 PM - 4:45 PM): Magnetic penetration depth measurements of the superconducting energy gap structure of UTe2 **Lev Levitin** (4:45 PM - 5:00 PM): Unconventional superconductivity underpinned by antiferromagnetism in $YbRh_2Si_2$
	Metals and Correlated Electron Systems 4. Room: 118/119 (First Floor) **Dr Cameron Dashwood** (3pm-3:30pm): Strain control of a bandwidth-driven spin reorientation in Ca3Ru2O7 **Professor Joseph Betouras** (3:30pm-4pm): Higher order van Hove singularities in quantum materials **Anirudh Chandrasekaran** (4pm-4:15pm): Possible role of higher order singularities in Sr2RuO4 – a theoretical perspective **Dr Luke Rhodes** (4:15pm-4:30pm): Stabilization of in-plane ferromagnetism at the surface of quantum critical Sr3Ru2O7

3pm – 5pm	**1. Nonequilibrium Physics 2. Instruments and Applications. Room: 109 (First Floor)** **Zhengming Wu** (3pm-3:15pm): NanoFrazor Lithography for advanced 2D&3D nanodevices **Dr Jan Nyeki** (3:15pm-3:30pm): High performance rapid turn-around cryogen-free microkelvin platform: unlocking the sub-1mK temperature range for quantum materials research **Dr. Charles Downing** (3:30pm-3:45pm): Exceptional points from two-photon driving **George McArdle** (3:45pm-4:00pm): Absence of thermalisation in a quantum dot **Dr Jessica Boland** (4pm-4:30pm): SNOM lights up the nanoscale: non-destructive nanoscale optoelectronic characterisation via scattering-type Near-field optical microscopy **Jonathan Alaria** (4:30pm-4:45pm): Chemically controllable magnetic transition temperature and magneto-caloric properties in MnZnSb based compounds **Dr Joseph Prentice** (4:45pm-5pm): Efficient computation of optical properties of large-scale heterogeneous systems
5pm – 5:10pm	Depart

Poster Presentions

Poster Number	Name	Paper Title
1	Aisha Albeladi	Unlocking the Hidden Power: Unravelling Sub-Bandgap Photoconductivity in Synthetic Cu2O under Pulsed Laser Excitation at IR wavelength
2	Rasha Algethami	Modelling of Microstructure Evolution During Polymer Crystallisation
3	Hanan Alhabeadi	Statistical Analysis of the Distribution of single atoms and Nanoclusters on Surfaces
4	Dr Abhisek Bandyopadhyay	Sr3LiIrO6: a potential quantum spin liquid candidate in quasi-1-D d4 iridate family
5	Dr Deepnarayan Biswas	Soft X-ray angle-resolved photoelectron spectroscopy with a momentum microscope at Diamond Light Source
6	Chandan Singh	Superconductor/ferromagnet van der Waals heterostructure: Appearance of Majorana zero mode
7	Amit Chauhan	Exploration of novel quantum phases and large magnetic anisotropy energy in low-spin d5 perovskites: Bulk and Ultra-thin films
8	Dr Matthew Coak	SquidLab - a user-friendly program for background subtraction and fitting of magnetization data
9	Dr Arthur Coveney	Rapid Prototyping of Novel Devices with In-situ Deposition, Imaging and Thermal Nanolithography
10	Sam Cross	Superconductivity at 90 K in a lanthanum hydride film synthesised using elemental lanthanum and ammonia borane at 95 GPa
11	Deepanjan Das	Exploring quantum paraelectricity as a mechanism for parametric amplification
12	Buddhadeb Debnath	Signatures of Orbital Selective Mott state in doped Sr3Ru2O7
13	Dr Dirk Honecker	Probing the Magnetization Distribution in Ferrite Nanoparticles with Magnetic SANS
14	Aidan Horne	High Resolution Imaging of Silicon Vacancy Colour Centres in Diamond Using 4D-STEM and Electron Ptychography
15	Tim Huijbregts	Suppressing superconductivity in high-Tc cuprates with intense current pulses
16	Clio Johnson	Homogeneous, Isotropic, Three-body Backflow Correlation in Quantum Monte Carlo Simulations
17	Saba Khan	Vibrating carbon nanotubes: A nanomechanical probe to study quantum phenomena in superfluid 3He/4He
18	Colin Kirkbride	Fullerene Thin Films as a Route to Skyrmion Nucleation
19	Hemant KumarLimbu	Molecular dynamics study on the relation between atomic structure and temperature of Mg-Zn alloys for metal air batteries electrodes
20	Elie Merhej	Dynamical correlations in the Hubbard ladder after a pump-probe quantum quench
21	Sang Soon Oh	Euler class for topological phase transition of nodal lines in spring-mass systems
22	Ioana Paulescu	Quantum oscillations of a candidate bulk Dirac system
23	David Reid	Theoretical investigation on topologically robust edge-states in a harmonic synthetic dimension and its experimental realisation.
24	Professor John Saunders	Quantum bath suppression in a superconducting circuit by immersion cooling
25	Shobhna Singh	THE O(N) LOOP MODEL ON QUASICRYSTALS
26	Dr Hideo Takeuchi	Free induction decay processes of folded longitudinal acoustic phonons dependent on a constituent layer ratio in one period of GaAs/AlAs superlattices in a finite system: Effects of the phonon dispersion curve
27	Amie Troath	Exploring topological excitations of S=1/2 kagome ferromagnets using inelastic neutron scattering
28	Dr Matthew Watson	Novel electronic structures from near-surface stacking faults
29	Huseyin Bilge Yagci	Enhanced collection efficiency from single colour centres in aluminium nitride micropillars
30	Mihir Date	Bulk and surface electronic structure of Nb3Br8