

# International Conference on Quantum Fluids and Solids 2023

University of Manchester,  
Engineering Building,  
Booth Street East

Wednesday 9th –  
Tuesday 15th August



## Thursday 10 August

09:00–9:20 Opening welcome

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### **SESSION TH1 Superfluid $4\text{He}$ and $3\text{He}$** – Chair: Richard Haley

09:20–09:45 *Brillouin spectroscopy of metastable superfluid helium-4*  
**Jules Grucker**

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09:45–10:10 *Observation of fluctuations in the viscosity just above the superfluid transition in  $3\text{He}$*  – **Jeevak Parpia**

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10:10–10:30 *Pairing fluctuation effects on quasiparticle transport above  $T_c$*   
**Jim Sauls**

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10:30–10:50 *Overcritical Fermi Superfluids* – **Lev Melnikovsky**

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10:50–11:20 Coffee

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### **SESSION TH2 Superfluid $3\text{He}$** – Chair: John Saunders

11:20–11:45 *Superfluid  $\text{He-3}$  suppression near atomically smooth surfaces*  
**Anton Vorontsov**

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11:45–12:10 *Measurement of  $3\text{He-A}$  critical velocity in micron-scale slabs*  
**Alexander Shook**

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12:10–12:30 *Superconducting Nano-oscillators fabricated with wire drawing technology* – **Dmitry Zmeev**

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12:30–12:50 *Spectroscopic imaging study on the domain structure in superfluid  $3\text{He}$*  – **Yutaka Sasaki**

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12:50–13:50 Lunch

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### **SESSION TH3 Exciton-Polaritons** – Chair: Carlo Barenghi

13:50–14:15 *Novel non-equilibrium phenomena in quantum fluids of light*  
**Marzena Szymańska**

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14:15–14:40 *Bose-Einstein condensation of excitons in a bulk semiconductor at sub-kelvin temperatures* – **Kosuke Yoshioka**

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14:40–15:00 *Controlling exciton–polariton vortices with orbital angular momentum of light* – **Hyoungsoon Choi**

15:00–15:30 Coffee

**SESSION TH4 Quantum Vortex** – Chair: Wei Guo

15:30–15:55 *Non-linear dynamics of the trapped quantum vortex in superfluid 4He*  
**Sergei Kafanov**

15:55–16:20 *Probing superfluid 3He with a nanoelectromechanical oscillator*  
**Vladimir Eltsov**

16:20–16:40 *Quantized vortices visualized using silicon nanoparticles in superfluid helium* – **Yosuke Minowa**

16:40–17:00 *Structure of superfluid suction vortex* – **Ken Obara**

17:00–18:30 **TH5 Poster Session 1**

## Friday 11 August

**SESSION FR1 Confined 4He** – Chair: Keiya Shirahama

09:00–09:25 *Finite-size effects and nonlinear behaviour in strongly confined superfluid helium* – **Emil Varga**

09:25–09:50 *Structural study of two-dimensional helium on graphite with synchrotron radiation X-rays* – **Akira Yamaguchi**

09:50–10:10 *Atomically thin superfluid and solid phases for atoms on strained graphene* – **Adrian Del Maestro**

10:10–10:30 *A novel experimental platform for unveiling quantum phenomena in helium films adsorbed on graphite* – **Eunseong Kim**

10:30–11:00 Coffee

**SESSION FR2 Quantum Fluids for Cosmology 1**

Chair: Andrew Casey

11:00–11:25 *Searching for ultralight dark matter using superfluid helium optomechanical systems* – **Swati Singh**

11:25–11:50	<i>HeRALD: Measurement of dark matter scattering events in superfluid helium-4 through quantum evaporation and energy-resolved single photon detection</i> – Dan McKinsey
11:50–12:10	<i>QUEST-DMC: low mass dark matter search with superfluid helium-3</i> Elizabeth Leason
12:10–13:10	Lunch
	<b>SESSION FR3 Quantum Turbulence 1</b> – Chair: Ladislav Skrbek
13:10–13:35	<i>Characterization and universal scaling properties of a turbulent atomic superfluid</i> – Vanderlei Bagnato
13:35–14:00	<i>Visualization study of the law of wall in superfluid helium-4</i> – Wei Guo
14:00–14:20	<i>2D quantum turbulence in a fluid of light</i> – Dario Ballarini
14:20–14:40	<i>Flying balls in superfluid helium</i> – Courtney Elmy
14:40–15:10	Coffee
	<b>SESSION FR4 Novel Superfluids and Superconductors</b> Chair: Jim Sauls
15:10–15:50	<b>Alexander Andreev Memorial</b> Speakers: Jim Sauls, George Pickett, Igor Todoshchenko
15:50–16:15	<i>Visualizing the zero-energy surface Andreev bound states of spin-triplet superconductor UTe<sub>2</sub></i> – Shuqiu Wang
16:15–16:40	<i>Unconventional superconductivity underpinned by antiferromagnetism in YbRh<sub>2</sub>Si<sub>2</sub></i> – Lev Levitin
16:40–17:00	<i>Light induced magnetism via the inverse Faraday effect</i> – Priya Sharma
17:00–18:30	<b>FR5 Poster Session 2</b>

## Saturday 12 August

**SESSION SA1 Quantum Gases** – Chair: Vanderlei Bagnato

09:00–09:25 *Rotating dipolar quantum gases: vortices, supersolids, and glitches*  
Thomas Bland

09:25–09:50 *Dimensionality crossover in a weakly interacting atomic Bose gas and the dynamics of quantum droplets: A study of phase transitions*  
**Nick Keeperfer**

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09:50–10:15 **Discussion of Diversity & Inclusion in Physics**  
*Speaker: Priya Sharma*

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10:15–10:45 Coffee

**SESSION SA2 Confined Superfluid Helium**

*Chair: Hiroshi Fukuyama*

10:45–11:10 *Superfluid helium-3 under mesoscopic confinement: low magnetic fields and phase transitions – Petri Heikkinen*

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11:10–11:35 *Thermal generation of spin currents in superfluid 3He*  
**Takeshi Mizushima**

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11:35–11:55 *Multiple phase-slip phenomenon in 4He superflow through a well-defined microchannel – Keiya Shirahama*

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11:55–12:15 *Superfluidity and Luttinger-liquid behavior of helium in 1D limit*  
**Junko Taniguchi**

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12:15–13:15 Lunch

13:15–13:30 Group Photo

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**SESSION SA3 Electrons on Helium and Neon – Chair: Stephen Lyon**

13:30–13:55 *Single electrons on solid neon: a long-coherence high-fidelity solid-state qubit platform – Dafei Jin*

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13:55–14:20 *Rydberg-state detection for electrons-on-helium qubits*  
**Denis Konstantinov**

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14:20–14:40 *High-frequency collective dynamics of electrons on helium*  
**Johannes Pollanen**

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14:40–15:00 *Stability and dynamics of multielectron bubbles in liquid helium*  
**Ambarish Ghosh**

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15:00–15:30 Coffee

**SESSION SA4 Quantum Turbulence 2** – Chair: Viktor Tsepelin

15:30–15:55 *Quantum gas in a box* – Zoran Hadzibabic

15:55–16:20 *Turbulent steady states in Bose-Einstein condensates*  
**Giorgio Krstulovic**

16:20–16:40 *HVBK equation-based theory of developed counterflow superfluid turbulence* – Victor L'vov

16:40–17:00 *Drag force due to quantum viscosity in superfluid 4He at zero temperature* – Hiromitsu Takeuchi

17:00–18:30 **SA5 Poster Session 3**

## Sunday 13 August

11:00–13:00 & 14:00–16:00 Excursions

## Monday 14 August

**SESSION MO1 Quantum Fluids for Cosmology 2**

Chair: William Halperin

09:00–09:25 *The AB transition in superfluid 3He and cosmological phase transitions* – Mark Hindmarsh

09:25–09:50 *Superfluid bathtub vortex: a potential simulator of a quantum black hole* – Patrik Svancara

09:50–10:10 *Searching for axions and nonlinear QED with high-Q superconducting resonators* – Hikaru Ueki

10:10–10:30 *Landau level spectroscopy and edge magnetoplasmons on electrons on helium* – Alexei Chepelianskii

10:30–11:00 Coffee

## **SESSION MO2 Superfluid Optomechanics** – Chair: Emil Varga

11:00–11:25

*Nonlinear waves and solitons in superfluid helium films*

**Cristopher Baker**

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11:25–11:50

*Optomechanics with magnetically levitated drops of liquid  $^3\text{He}$  and  $^4\text{He}$*  – **Yogesh Patil**

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11:50–12:10

*Three-tone coherent microwave optomechanical measurement of a superfluid Helmholtz resonator* – **Sebastian Spence**

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12:10–12:30

*Microwave optomechanics and cryogen-free nuclear demagnetization refrigeration* – **Andrew Fefferman**

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12:30–13:30 Lunch

## **SESSION MO3 Superfluid $^3\text{He}$ in Aerogel, etc.**

Chair: Jeevak Parpia

13:30–13:55

*Magnetic susceptibility of Andreev bound states in superfluid  $^3\text{He-B}$  in anisotropic aerogel* – **John Scott**

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13:55–14:20

*Oscillations of nematic aerogel in a superfluid medium*  
**Evgeny Surovtsev**

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14:20–14:40

*Superfluid  $^3\text{He}$  in planar and nematic aerogels* – **Man Nguyen**

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14:40–15:00

*Neutron imaging of an operational dilution refrigerator*  
**Christopher Lawson**

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15:00–15:30 Coffee

## **SESSION MO4 Hall & Vinen Memorial Session**

Chair: Peter McClintock

15:30–15:50

*The legacy of Henry Hall and Joe Vinen in quantum fluids and beyond*  
**Andrei Golov**

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15:50–16:15

*Henry Hall and the early days of superfluid  $^3\text{He}$  at Manchester*  
**George Pickett**

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16:15–16:35

*Quantum turbulence: the legacy of W.F. Vinen* – **Carlo Barenghi**

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16:35–16:55	<i>Collective dynamics of ions and vortices in He II in experiments of Joe Vinen</i> – <b>Ladislav Skrbek</b>
16:55–17:15	<i>Studies on quantum turbulence with Vinen</i> – <b>Makoto Tsubota</b>
17:15–17:35	<i>Rotating quantum wave turbulence and onset of the Kelvin wave cascade</i> – <b>Jere Makinen</b>
19:00–22:30	<b>Conference Dinner</b> (Whitworth building, Oxford Road)

## Tuesday 15 August

### **SESSION TU1 Cryogenic Techniques** – Chair: Andrew Fefferman

09:00–09:25	<i>Development of the continuous sub-millikelvin refrigerator</i> <b>Hiroshi Fukuyama</b>
09:25–09:50	<i>High performance rapid turn-around cryogen-free microkelvin platform: unlocking the sub-1mK temperature range for quantum materials research</i> – <b>Jan Nyeki</b>
09:50–10:10	<i>On-chip magnetic cooling of nanoelectronic devices</i> <b>Jonathan Prance</b>

10:10–10:40 Coffee

### **SESSION TU2 Quantum Solids** – Chair: Xavier Rojas

10:40–11:05	<i>Acoustic Casimir effect and fate of thermodynamics in mesoscopic matters</i> – <b>Igor Todoshchenko</b>
11:05–11:30	<i>Supertransport in the core of dislocations in solid Helium-4</i> <b>Anatoly Kuklov</b>
11:30–11:50	<i>Influence of ortho-H<sub>2</sub> molecules on accumulation and spatial diffusion of H atoms in solid H<sub>2</sub> films</i> – <b>Vladimir Khmelenco</b>
11:50–12:30	Closing ceremony
12:30	Packed Lunch