



Phononics

2023

6th INTERNATIONAL CONFERENCE ON PHONONIC CRYSTALS/METAMATERIALS/
METASURFACES, PHONON TRANSPORT, AND TOPOLOGICAL PHONONICS

June 12 - 16, 2023 – Manchester, England

Programme





**6th INTERNATIONAL CONFERENCE ON PHONONIC CRYSTALS/METAMATERIALS/
METASURFACES, PHONON TRANSPORT, AND TOPOLOGICAL PHONONICS**

June 12 - 16, 2023 – Manchester, England

Welcome to Phononics 2023!



Prof. William J. Parnell
University of Manchester
Chair



Dr. Olga Umnova
University of Salford
Co-chair



Prof. Richard Craster
Imperial College London
Co-chair



University of
Salford
MANCHESTER

Imperial College
London

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Welcome from the Chair

I am absolutely delighted to bring the Phononics community back together again in Manchester following a pause in the conference since 2019 given the COVID-19 pandemic. It was a great shame that we did not get to experience the delights that Marrakech has to offer in 2021. It is a real honour to host this international conference in the UK and to showcase the latest research in the broad field of Phononics. Manchester has a rich history in Science, Engineering and Mathematics (see page 12 for a brief history of this). I hope that delegates get to learn more about this whilst here in the UK. The city of Manchester has changed enormously over the last 20 years, becoming a modern, diverse European city with a strong local economy and vibrant cultural scene. Everyone will no doubt be aware of its rich musical and sporting heritage but it's also worth noting the many areas of outstanding natural beauty that are close by. I hope that delegates get to experience some of the many exciting local attractions within the city but also some of the areas of further afield, outside the city.

I would like to thank all delegates for their support of the Phononics 20XX series and for making the effort to travel to Manchester. I am aware that the last few years has been a struggle for many and getting back into the swing of international travel is not necessarily easy, or inexpensive. However I hope that all delegates will benefit from being together in one venue again, which brings forth so many more benefits over and above the virtual meetings and conferences, as we know well.

I have many people to thank for their help in the organisation of the conference. Mahmoud Hussein (International Phononics Society - IPS) has been a constant source of support, energy and encouragement and without him I am not sure we would have got here! I am amazed by his ability to work around the clock to make things happen and to motivate others. I am also sincerely grateful to Mehmet Su, who cannot be here in Manchester unfortunately but has worked tirelessly behind the scenes for the IPS and for the conference on the website and technical matters. I also thank Ihab El-Kady for general matters relating to the IPS.

Locally I would like to thank our students Eleanor, Elena, Tom, and Valentin for various administrative matters, Lisa Jepson for help with hotels, and Anna Healy, who was incredibly responsive on all matters relating to the e-store. For all things of a printed and merchandise nature I thank Sam Pearson from Chapel Press, whose enthusiasm and helpfulness knows no bounds! Brookdale Bees, a local company in Manchester, supplied the honey. I'm grateful to them for stepping in at the last minute to help with

this. The fantastically creative John Cooper created our video. We have worked with John now for some years and I am always impressed by his imaginative approach, as well as his genuine interest in the science. Thanks to Eleanor Russell for her creative contributions to the programme covers and to my close colleague Raphael Assier, who listens very well and always offers thoughtful suggestions. Thanks in advance to our local helpers, who will be wearing yellow T-shirts all week. Do feel free to ask them for help if you need it. They will try to assist!

Thanks to Jane and Julie from the Manchester Conference Team for putting up with my persistent questions about every aspect of conference organisation. I am also grateful to the conference sponsors, listed on page 15, for their financial support.

Finally, thanks to my family for their understanding. As we all know it's not a 9 to 5 profession and certainly not when organising a large international conference!

Have a fabulous week in Manchester.



William J. Parnell
Professor of Applied Mathematics
Department of Mathematics
University of Manchester

Who's who at Phononics 2023

Conference Chair

William J. Parnell
University of Manchester, UK

Conference Co-chairs

Olga Umnova
University of Salford, UK

Richard Craster
Imperial College London, UK

IPS International Organising Committee

Bernard Bonello
Sorbonne Université (France)

Pierre Deymier
University of Arizona

Bahram Djafari-Rouhani
Université Lille 1 (France)

Ihab El-Kady
Sandia National Laboratories/University of New Mexico (USA)

Mahmoud I. Hussein
University of Colorado Boulder (USA)

Abdelkrim Khelif
Université de Franche-Comté-Besançon (France)

Baowen Li
University of Colorado Boulder (USA) and Southern UST, Shenzhen (China)

Charles M. Reinke
Sandia National Laboratories (USA)

José Sánchez-Dehesa
Universidad Politecnica de Valencia (Spain)

Clivia M.S. Torres
Catalan Institute of Nanoscience & Nanotech. (Spain)

Ying Wu
King Abdullah University of Science and Technology (Saudi Arabia)

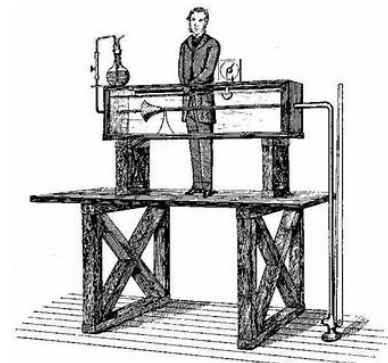
University of Manchester Student and Postdoc Helpers

Fatmeh Alsalami
Georgia Bradshaw
Charlotte Charlton
Sean Donner
Erik Garcia-Neefjes
Valentina Kunz
Hollie Lloyd
Daniel McKinnell
Elena Medvedeva
Frank Millward
Matt Nethercote
Ekaterina Nguyen
Aidan Retallick
James Shemilt
Tom White

A very brief history of Science, Engineering and Mathematics at the University of Manchester

The city of Manchester has made significant contributions to the fields of science, engineering and mathematics, dating back to the industrial revolution in England in the 18th and 19th centuries. During this time it became a modern hub for textile manufacturing and engineering. Engineers and inventors in Manchester pioneered the development of machinery and infrastructure that powered the industrialisation process. The city's canals, railways and mills became symbols of progress and innovation. One of Manchester's most notable scientists was John Dalton, an English chemist who formulated the atomic theory. His work revolutionised our understanding of matter and laid the foundations of modern chemistry.

In the 19th century Osborne Reynolds, a prominent engineer and applied mathematician, conducted groundbreaking experiments on fluid dynamics in Manchester. His research on fluid flow along channels established the concept of the *Reynolds number*, fundamental to the transition between turbulent and laminar flow. Reynolds' experimental apparatus is still kept in the basement of the old engineering buildings in Manchester.



Reynolds and his famous transition-to-turbulence experimental apparatus.

Of great relevance to wave mechanics is the work of Horace Lamb, who held the Beyer Chair in Applied Mathematics in Manchester from 1888 until 1920. Lamb was a renowned mathematician, with notable contributions to hydrodynamics, elasticity theory, and acoustics, among others. He is of course very well known for the waves in plates that bear his name. His famous furniture is still located in the Horace Lamb room in the Alan Turing building, home to the Department of Mathematics.



Sir Horace Lamb, who held the Beyer Chair at Manchester from 1888-1920.

During the late 19th and early 20th centuries the University of Manchester's Physics department was home to some of the giants of Physics including Rutherford, Bohr (briefly), WL Bragg and JJ Thomson, amongst others. Rutherford conducted his famous experiments that led to the discovery of the atomic nucleus whilst in Manchester.

He conducted these experiments between 1907 and 1919, bombarding thin metal foils, including gold, with positively charged alpha particles. Rutherford's observations led to the conclusions that most of the mass of an atom is concentrated in a small dense region (which he called the nucleus.....). This discovery revolutionised our understanding of the atom and laid the foundation for the development of nuclear physics.



When Rutherford returned to Cambridge in 1919, Manchester appointed William Lawrence Bragg, who had shared a Nobel Prize with his father for inventing x-ray crystallography and the famous Bragg scattering effect. He was succeeded by Patrick Blackett, who won a Nobel Prize for his work on cosmic rays. Interestingly, it was work on cosmic rays that led to radio astronomy and the University's world famous 'big dish', a radio telescope created by Bernard Lovell at Jodrell Bank in the 1950s (the venue of our social excursion on Wednesday morning).

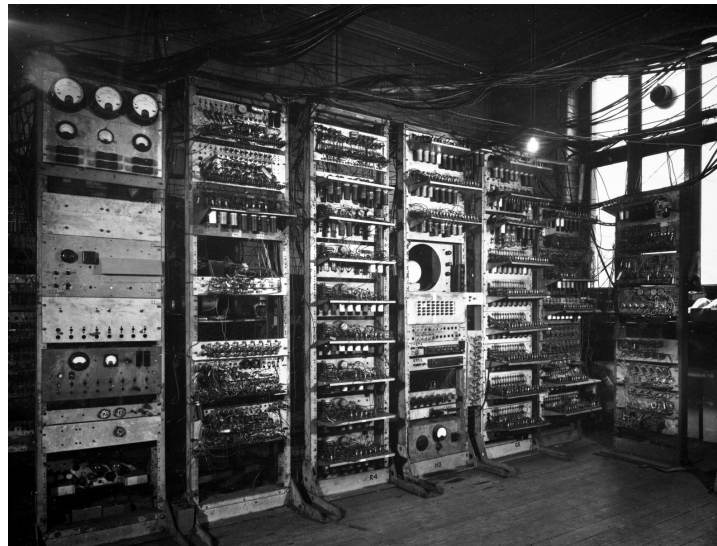
Moving back to the area of fluid dynamics, James Lighthill spent much of his career at Manchester. Lighthill made significant contributions to aerodynamics, acoustics and general mathematical aspects of wave motion. He also served as the Director of the Royal Aircraft Establishment.

In the 1960s the physics department moved to a new building, named after Schuster, on Brunswick Street. The old physics building was given over to psychology and now houses part of the University administration. Electrical engineering was initially linked with physics but became a separate department, from which developed Britain's first department of computer science, based on a series of pioneering computers, beginning with the *Manchester Baby*. This machine, built in 1948 by Freddie Williams and Tom Kilburn, is widely considered to be the world's first stored-program computer.

Working with Williams and Kilburn was, of course the Mathematician Alan Turing. His life and legacy is critically important to city and the University.

Turing is widely known for his concept of the Turing machine, a theoretical device that laid the groundwork for the study of computability and algorithms. Turing's work on code-breaking during World War II at Bletchley Park, and particularly his efforts in cracking the Enigma code, played a crucial role in the second world war. His contributions to the field of artificial intelligence were also groundbreaking. He proposed the idea of a *universal machine* capable of mimicking any other machine, which later became known as the Universal Turing Machine. This concept provided the theoretical underpinnings for the development of AI and computability.

In modern times Manchester has become well known for its research in graphene. Geim and Novoselov discovered a simple and effective method to isolate and study graphene, for which they were awarded the Nobel prize in Physics in 2010.



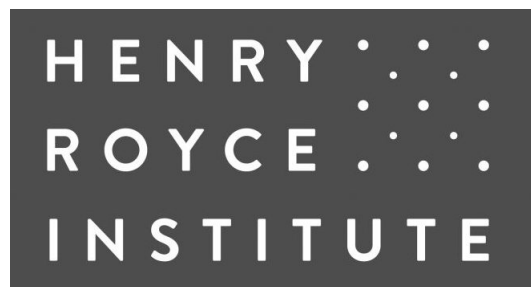
The Manchester baby, widely acknowledged to be the world's first stored program computer.

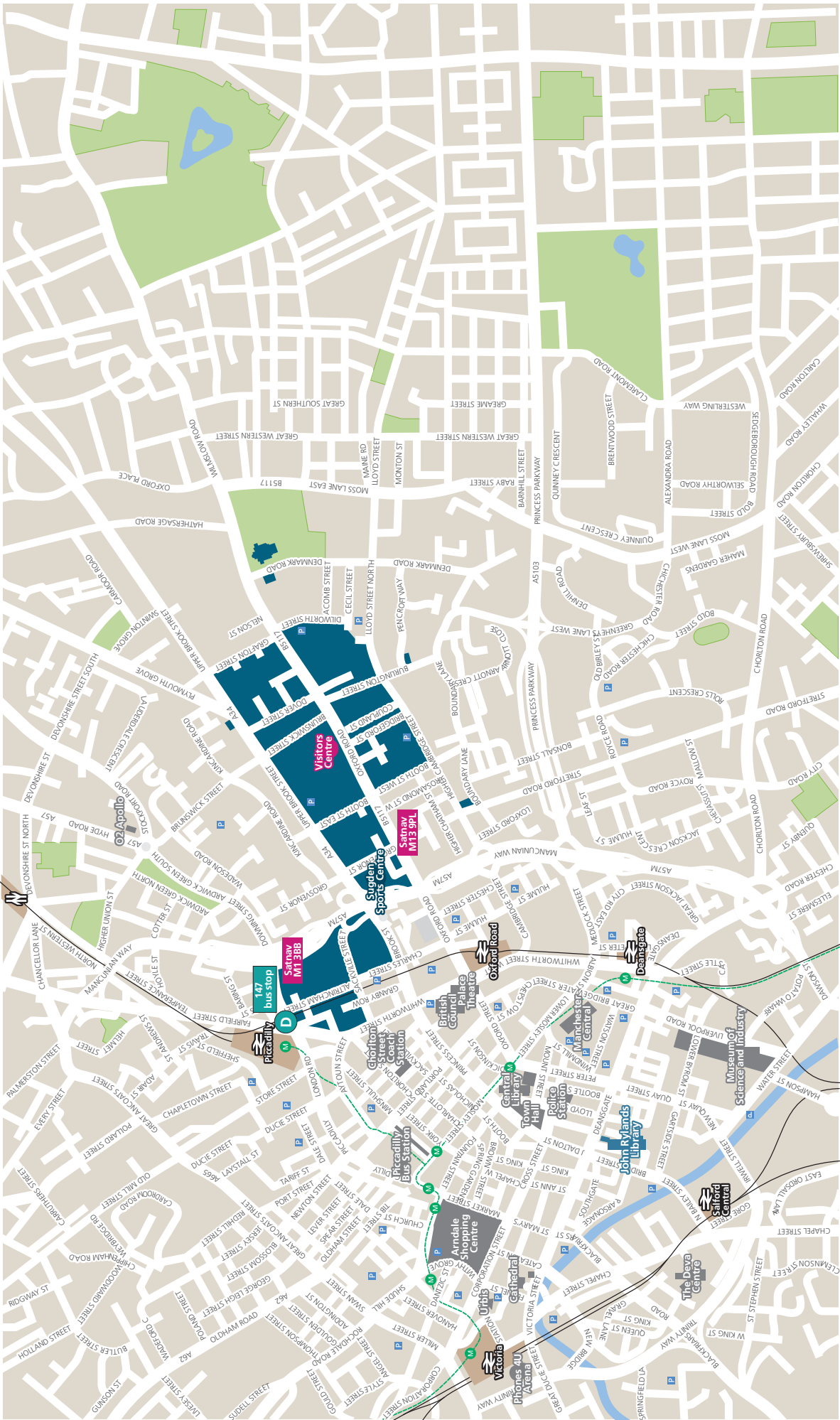


The Alan Turing memorial, located in Sackville Gardens, in central Manchester.

Sponsors

Manchester Mathematical Sciences





Key

- Campus buildings
- University residences
- Under construction
- Student information
- Principal car parks
- PC clusters
- Defibrillators
- 147 bus link
- Boards
- Automatic / electrical barrier
- Manual barrier

- A**
- 78 Academy
 - 37 Access Summit
 - Assessment Centre at Manchester
 - 83 Accommodation Office
 - 7 Aerospace Research Centre (UMAR)
 - Alan Gilbert
 - 46 Alan Turing Commons Building
 - 29 Alliance Manchester Business School (AMBS) including Ecolife Davies Library
 - 43 Coupling Building 3
 - 47 Coupling Building 3
 - 41 Crawford House
 - 33 Crawford House Lecture Theatres
 - 29 Curatorial Innovation Organisations
 - 29 AMBS Innovation, Management & Policy
 - 36 Applied Social Sciences
 - 76 AQA
 - 35 Architecture and Planning
 - 65 Art History and Visual Studies
 - 36 Arthur Lewis Building
 - 1 Association of University Administrators (AUA)
 - 46 AIB
 - 75 AV Hill Building
 - 73 Avila House (RC Chapel)

- B**
- 9 Barnes Wallis Building
 - 49 Beyer Building
 - 71 Biology, Medicine and Health (see also 42, 75, 77, 81, 88, 8 & 92)
 - 59 Biology, Medicine and Health Faculty Admin (see also 20)
 - 56 Economics
 - 77 Ellen Wilkinson Building
 - 54 Blackett Lecture Building
 - 25 Engineering Building B
 - 54 Braddick Library
 - 54 Bragg Lecture Theatre
 - 124 Brook Hall
 - 36 Brooks World Poverty Institute

- C**
- 86 Cardiovascular Sciences
 - 49 Car Park Office (Beyer Building)
 - 31 Careers and Employability
 - 37 Careers Service
 - 71 Careers Service Building
 - 35 Caithie Marsh Centre for Census and Survey Research (CCSR)
 - 48 Cell, Tissue Biology and Biophysics
 - 79 Centre for English Language Studies
 - 59 Centre for the History of Science, Technology and Medicine (CHSTM)
 - 65 Centre for New Writing
 - 14 Chemical Engineering (see also 89)
 - 61 Christabel Parkhill Institute
 - 63 Chemistry Building
 - 59 Chinese Studies
 - 32 Chinese Building/Distribution
 - 31 City Centre
 - 67 Classics and Ancient History
 - 49 Computing and Student Research Centre
 - 39 Computer Science

- D**
- 12 Dalton Nuclear Institute
 - 87 Denmark Road Building
 - 66 Dent Hospital
 - 42 Dent Research Centre (see also 41)
 - 48 Development
 - 71 Developmental Biology and Medicine (see also 79)
 - 75 Diabetes, Endocrinology and Metabolism (see also 71 & 86)
 - 37 Disability Advisory Support Services
 - 70 Dover Street Building
 - 42 Drama

- E**
- 52 Earth Sciences
 - 67 East Asian Studies
 - 11 Echoes Day Nursery
 - 27 ESEE High Voltage (see also 20)
 - 56 Economics
 - 77 Ellen Wilkinson Building
 - 34 Engineering Building A
 - 25 Engineering Building B
 - 54 Braddick Library
 - 54 Bragg Lecture Theatre
 - 124 Brook Hall
 - 36 Brooks World Poverty Institute

- F**
- 86 Ferrand Building
 - 48 Finance
 - 67 French Studies
 - 9 FSE Student Hub (Barnes Wallis)
 - 36 Geography
 - 56 Geology
 - 17 George Begg Building
 - 95 George Begg Building (see also 55)
 - 97 German Studies
 - 60 German Studies
 - 36 Goethe Institute
 - 56 Government
 - 86 International Immunology and Infection
 - 72 Graduate Engineering Innovation Centre
 - 40 Graduate Engineering Workshop
 - 52 GM Geological Unit
 - 83 Grove House
 - 59 Health and Safety Services
 - 34 Higher Education Careers Service Unit
 - 53 Learning Commons
 - 42 Lightwell Centre Library
 - 29 International Centre for Labour Studies

- G**
- 19 Master Building (Computational Engineering)
 - 36 Glasgow Lewis Building
 - 37 University Place
 - 71 MSS Tower
 - 22 Supton Sports Centre
 - 39 Kilburn Building
 - 24 Engineering Building A
 - 29 Engineering Building B
 - 26 Booth Street East Building
 - 29 John St Building
 - 29 Business School (AMBS) including Eddie Davies Library
 - 31 Dawson House
 - 32 St Peter's House / Chapel
 - 34 Prospect House
 - 17 George Begg Building

- H**
- 11 Humanities (Bridgford Street)
 - 52 Williamson Building
 - 53 Roscoe Building
 - 54 Schuster Building
 - 55 Main Library
 - 37 Waterloo Place
 - 39 Outfalls Hall
 - 40 Information Technology Building
 - 59 Simon Building
 - 60 Zochonis Building
 - 61 Chemistry Building
 - 62 Denton Hall
 - 63 Copied and Ring 1
 - 64 Copied and Ring 2
 - 44 Copied and Ring 3
 - 46 Alan Turing Building
 - 47 Coupling Building 3
 - 48 John Owens Building
 - 49 Beyer Building
 - 50 Whitworth Hall
 - 51 Whitworth Building

- I**
- 35 Humanities (Bridgford Street)
 - 52 Williamson Building
 - 53 Roscoe Building
 - 54 Schuster Building
 - 55 Main Library
 - 37 Waterloo Place
 - 39 Outfalls Hall
 - 40 Information Technology Building
 - 59 Simon Building
 - 60 Zochonis Building
 - 61 Chemistry Building
 - 62 Denton Hall
 - 63 Copied and Ring 1
 - 64 Copied and Ring 2
 - 44 Copied and Ring 3
 - 46 Alan Turing Building
 - 47 Coupling Building 3
 - 48 John Owens Building
 - 49 Beyer Building
 - 50 Whitworth Hall
 - 51 Whitworth Building

- J**
- 1 Sackville Street Building
 - 7 James Light Hill Building
 - 8 Renold Building
 - 9 Barnes Wallis Building / FSE Student Hub
 - 11 Manchester Conference Centre and Pentium Hotel
 - 12 Park Street Building
 - 13 Manchester Meeting Place
 - 14 The Mill
 - 16 Morton Laboratory
 - 16 Manchester Institute of Biotechnology (John Garside Building)
 - 17 George Begg Building

- K**
- 45 International Development
 - 68 International Society
 - 67 Italian Studies
 - 89 James Chadwick Building
 - 124 Hyatt Regency Manchester
 - 48 Income Office
 - 86 Infection, Immunity and Respiratory Medicine (see also 71, 75 & 79)
 - 72 Intelligent Imaging and Data Sciences
 - 40 Information Technology Building
 - 36 Institute for Development Policy and Management (IDPM)
 - 12 International Centre for Advanced Materials
 - 53 Learning Commons
 - 42 Lightwell Centre Library
 - 29 International Centre for Labour Studies

- L**
- 67 Language Centre
 - 52 Law
 - 53 Learning Commons
 - 42 Lightwell Centre Library
 - 29 International Centre for Labour Studies

- M**
- 29 Manchester Institute of Innovation Research
 - 13 Manchester Meeting Place
 - 44 Manchester Museum
 - 79 Manchester Surgical Skills Centre
 - 11 Manchester University Press
 - 8 Manchester University Press
 - 41 Manchester Dental (MHDLC) Centre
 - 36 Manchester Research Centre (MRC)
 - 81 Manchester Incubator
 - 31 Marsden Institute for the Day
 - 35 Manchester Institute for Collaborative Research on Ageing (MICRA)
 - 16 Manchester Institute of Biotechnology (John Garside Building)
 - 77 Manchester Institute of Education

- N**
- 60 National Graphene Institute
 - 90 Neurosciences Research and Primary Care
 - 52 Preclinical Library
 - 79 School of Biological Sciences (see also 60, 75, 79, 86, 88 & 92)
 - 79 School of Health Sciences
 - 79 School of Medicine (see also 41, 47, 59, 71, 75 & 86)
 - 48 Regional and Responsibility
 - 88 Optometry Clinics

- O**
- 31 Occupational Health and Safety
 - 36 Office for Social Responsibility
 - 88 Optometry Clinics

- P**
- 68 Students' Union Oxford Rd
 - 9 Students' Union Sackville St
 - 37 Studying and Working Abroad
 - 50 Whitworth Corridor
 - 38 Sustainable Consumption Institute
 - 77 Speech Pathology
 - 69 Sports Directorate
 - 53 Start Learning and Support Office
 - 66 Steadman Joseph Studio
 - 79 Stoford Building
 - 37 Student Communications and Marketing
 - 45 Student Experience
 - 86 UMIP
 - 67 University Centre for Academic English
 - 1 University College Union
 - 37 University Place
 - 72 Vaughan House
 - 88 Vision Science

- R**
- 48 Regional and Responsibility
 - 88 Optometry Clinics

- S**
- 32 St Peter's Chapel
 - 1 Sackville Street Building
 - 67 Samuel Alexander Building
 - 79 Samuel Alexander Building
 - 79 School of Biological Sciences (see also 60, 75, 79, 86, 88 & 92)
 - 79 School of Health Sciences
 - 79 School of Medicine (see also 41, 47, 59, 71, 75 & 86)
 - 1 Science and Engineering Faculty Office
 - 48 Registrar and Secretary

- T**
- 48 Teaching, Learning and Support Office
 - 1 Textiles
 - 34 The Athium
 - 17 The Mill
 - 7 UMAR
 - 86 UMIP
 - 67 University Centre for Academic English
 - 1 University College Union
 - 37 University Place
 - 72 Vaughan House
 - 88 Vision Science

- U**
- 54 Schuster Building
 - 8 Religions and Theology
 - 54 Schuster Building
 - 58 Research and Business Services
 - 92 Social Work
 - 36 Society
 - 126 Royce Hub Building
 - 67 Russian Studies
 - 38 Sustainable Consumption Institute
 - 54 Speech and Language Therapy
 - 77 Speech Pathology
 - 69 Sports Directorate
 - 53 Start Learning and Support Office
 - 66 Steadman Joseph Studio
 - 79 Stoford Building
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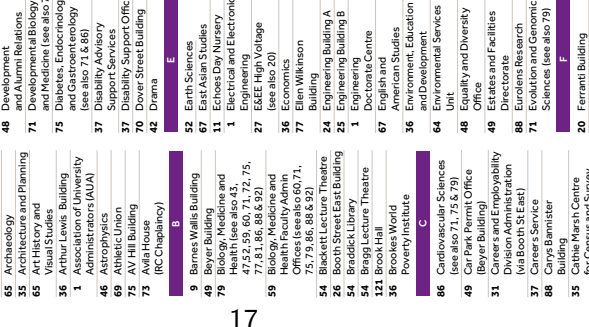
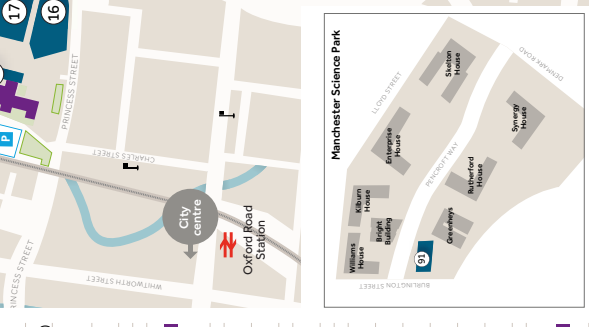
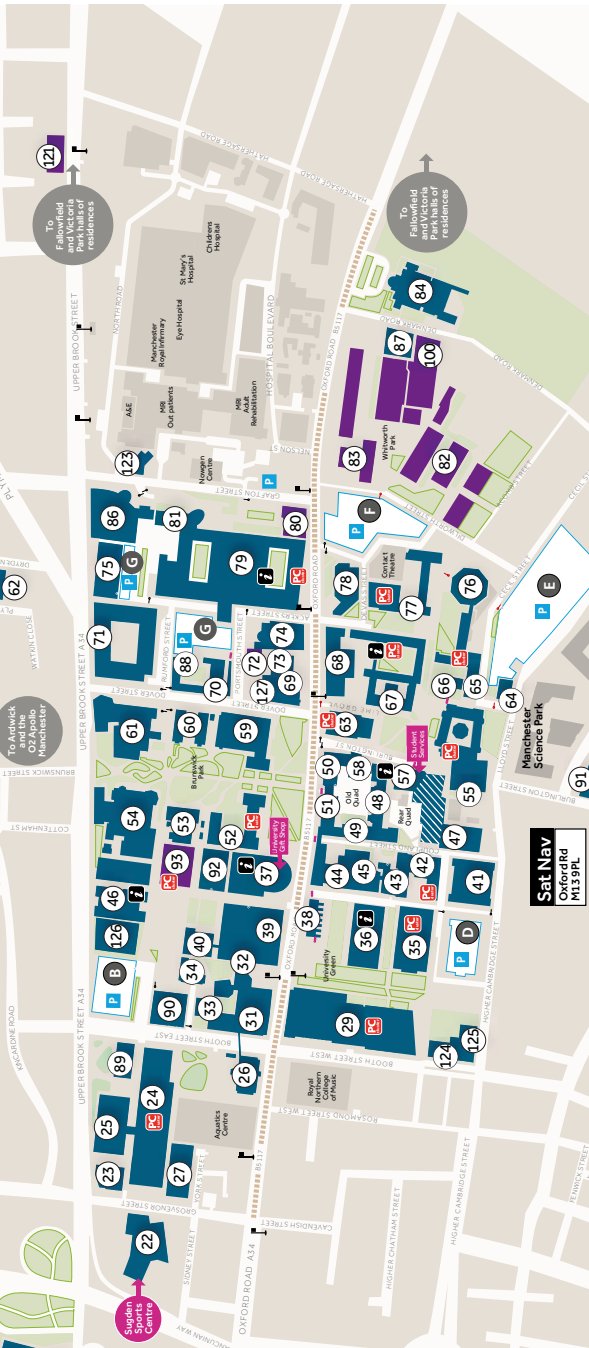
- V**
- 37 Student Support, Advice and Guidance
 - 48 Student System Office

- W**
- 38 Waterloo Place
 - 59 Walking Room
 - 11 Weston Hall
 - 84 The Whitworth
 - 50 Whitworth Building
 - 38 Whitworth Corridor
 - 69 Whitworth Hall
 - 69 Whitworth House
 - 52 Williamson Building
 - 27 York St Building
 - 60 Zochonis Building

- X**
- 1 X-ray

- Y**
- 37 Young Enterprise

- Z**
- 60 Zochonis Building



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- 38 Waterloo Place
 - 59 Walking Room
 - 11 Weston Hall
 - 84 The Whitworth
 - 50 Whitworth Building
 - 38 Whitworth Corridor
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 - 69 Whitworth House
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- 1 X-ray

- Y**
- 37 Young Enterprise

- Z**
- 60 Zochonis Building

- A**
- 12 Conference Office
 - 36 Confucius Institute
 - 35 Cordingley Lecture Theatre
 - 86 Core Technology
 - 78 Core Technology Centre (UMAR)
 - Alan Gilbert
 - 46 Alan Turing Commons Building
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 - 47 Coupling Building 3
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 - 51 Whitworth Building

- I**
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 - 68 International Society
 - 67 Italian Studies
 - 89 James Chadwick Building
 - 124 Hyatt Regency Manchester
 - 48 Income Office
 - 86 Infection, Immunity and Respiratory Medicine (see also 71, 75 & 79)
 - 72 Intelligent Imaging and Data Sciences
 - 40 Information Technology Building
 - 36 Institute for Development Policy and Management (IDPM)
 - 12 International Centre for Advanced Materials
 - 53 Learning Commons
 - 42 Lightwell Centre Library
 - 29 International Centre for Labour Studies

- J**
- 29 Manchester Institute of Innovation Research
 - 13 Manchester Meeting Place
 - 44 Manchester Museum
 - 79 Manchester Surgical Skills Centre
 - 11 Manchester University Press
 - 8 Manchester University Press
 - 41 Manchester Dental (MHDLC) Centre
 - 36 Manchester Research Centre (MRC)
 - 81 Manchester Incubator
 - 31 Marsden Institute for the Day
 - 35 Manchester Institute for Collaborative Research on Ageing (MICRA)
 - 16 Manchester Institute of Biotechnology (John Garside Building)
 - 77 Manchester Institute of Education

The Conference Space and Events Details

We are using essentially *three* spaces for the conference inside the MECD building at Manchester. These are all accessible on the 2nd floor of the MECD building (see floor maps on pages to follow) and they are:

- Eventspace 3: Rooms 2A.011, 2A.012, 2A.013, 2A.014 and foyer space.
- Main Lecture Theatre A: 2A.040.
- Blended Lecture Theatre: 2B.020

Eventspace 3 is where the registration desk is located, and is where all refreshment and lunch breaks will take place. The cloakroom is also located here.

The majority of the talks will be held in the Main Lecture Theatre A: 2A.040. The *back* of this lecture theatre is accessible from the 2nd floor. The front of the theatre can be accessed from the 1st floor.

When we switch to two parallel sessions on Monday, Tuesday and Friday, in addition to 2A.040 we will also use our third space, the Blended Lecture Theatre, 2B.020. This is located in Building B, which is accessible across the Link Bridge on the second floor, midway between Eventspace 3 and the Main Lecture Theatre along the main walkway. **All three spaces are highlighted in red on the 2nd floor map.**

We advise you to enter the MECD building via either the north or south entrances. Our helpers will also be located at these entrances to guide you to the right place.

Welcome Drinks Reception - Monday 12th June - 18:45-20:30

This will be held in the Manchester museum on Oxford Road. Building number 44 on the Campus Map (page 18).

The Conference Dinner - Tuesday 13th June - 19:30-end

Tickets to this should have been purchased in advance. You will have been issued with your ticket(s) at registration. A pre-dinner drinks reception will be held from 19:30-20:00 in Christie's Bistro, building number 58 on the Campus Map (page 18), before we move into the historic Whitworth Hall (building number 50 on the Campus Map) for the dinner at 20:00.

Social Excursion - Wednesday 14th June

Tickets to this should have been purchased in advance. You will have been issued with your ticket(s) at registration. Buses will depart from in front of the Hyatt Regency Manchester Hotel (Building number 124 on the Campus Map). Delegates should arrive by 8am. **Please do not be late!**

General Interest Lecture - Wednesday 14th June - 18:00-19:00

Prof. Trevor Cox will be giving the general interest lecture in the Main Lecture Theatre A (2A.040), with a drinks reception held in advance 17:15-18:00.

A Celebration of Architectural Acoustic Aberrations

Professor Trevor Cox, Acoustic Research Centre, University of Salford

Acoustic consultants try to make sure rooms do not have problems such as focussed echoes from domes, excessive reverberation and flutter echoes from parallel walls. But in this paper, I will celebrate these acoustic 'defects' and other extraordinary architectural sounds.

The science behind some historical examples, such as the whispering gallery in St Paul's in London, was solved around a century ago, but others, like the underneath of Echo Bridge in Massachusetts, which was debated in the scientific literature in the 1940s, have never had the physics

fully resolved until recently. Some have suggested that Stonehenge should have extraordinary sounds due to the concave arrangement of the stones, but measurements on a 1:12 acoustic scale model of the site show this is unlikely. Mathematicians use billiards to explore dynamical systems, but real-life audio examples are rare. One of those is the abandoned Thurgoland railway tunnel near Penistone, UK that has an extraordinary metallic flutter arising from closed orbits. The acoustic phenomena play with our perception of sound: in the spherical radome on top of the disused Cold War spy station at Teufelsberg near Berlin, you can whisper into your own ears. Included in the sites to be present will be the disused World War II oil tank which Guinness awarded with the record for the 'longest echo'. Details of acoustic measurements in the space will be presented, where the reverberation time is 112 seconds at 125 Hz, along with discussions of why it is so reverberant. Remarkable architectural sound effects usually arise by chance, being an accidental by-product of geometry. Using prediction models, the paper will also explore what sound effects could be created if designers deliberately set out to maximise acoustic aberrations.

Biography

Trevor Cox is Professor of Acoustic Engineering at the University of Salford where he directs the Acoustic Research Centre. He is a past president of the UK's Institute of Acoustics and was awarded the IoA Tyndall Medal. His research covers architectural acoustics, psychoacoustics and audio. He has been PI/CI on 10 EPSRC projects on built environment acoustics. Current EPSRC projects include two on machine learning challenges to improve hearing aids. Trevor co-wrote the definitive text on room Acoustic Absorbers and Diffusers (CRC Press). He was an EPSRC Senior Media Fellow. He has presented 26 documentaries for BBC radio including: The Physicist's Guide to the Orchestra. He won an ASA Science Writing Award for his popular science book Sonic Wonderland. The book describes the oil tank where he broke the Guinness World record for the longest echo. His latest popular science book is Now You're Talking.

Early career Workshop - Thursday 15th June - 17:00-18:30

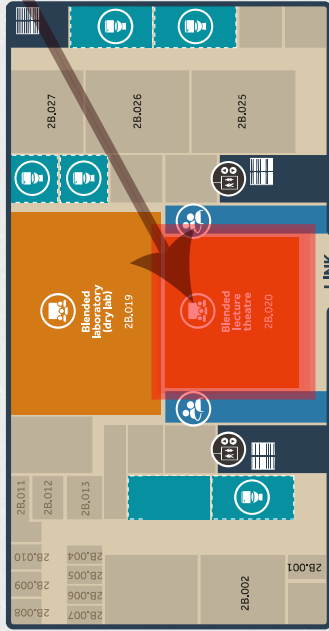
This event, focussed on Early Career Researchers, will be held in the Blended Lecture Theatre (2B.020). It will be led by the Engineering and Physical Sciences Research Council (EPSRC) UK Metamaterials Network. The session will consist of talks from members from the Network about its mission and objectives, and the EPSRC about general funding scheme and approaches to obtaining funding, from a general perspective. The session will close with a session on storytelling in science, led by Anna Ploszajski (www.annaploszajski.com).

If you are a PhD student, postdoctoral research, research fellow or in any way deem yourself to be at an early career stage, we would highly encourage you to attend this event, which forms an important part of the conference!

2 SECOND FLOOR

2B.020

ENGINEERING BUILDING B, SECOND FLOOR



LINK BRIDGE

ENGINEERING BUILDING A, SECOND FLOOR



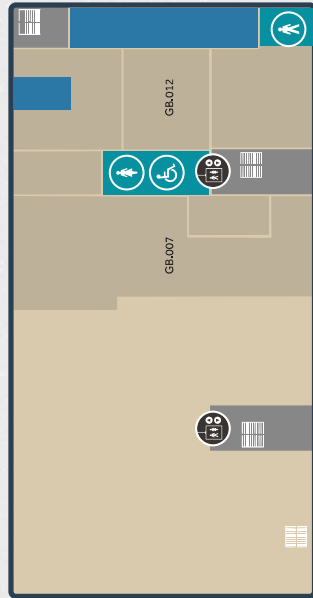
EVENTSPACE 3

2A.040

- Female Toilet
- Male Toilet
- Accessible Toilet
- All Gender Toilet
- Lift
- Café
- Student Support Hub
- Makerspace
- Computer Cluster
- Blended Lecture Theatre
- Tiered Lecture Theatre A
- Tiered Lecture Theatre B
- Workspace
- Collaboration and Study Space
- Informal Study Space
- Swipe card access

FIRST FLOOR

ENGINEERING BUILDING B, FIRST FLOOR



GOOGLE MAP
 Access the Google Map for our building by scanning the QR code

Lifts for student use

ENGINEERING BUILDING A, FIRST FLOOR

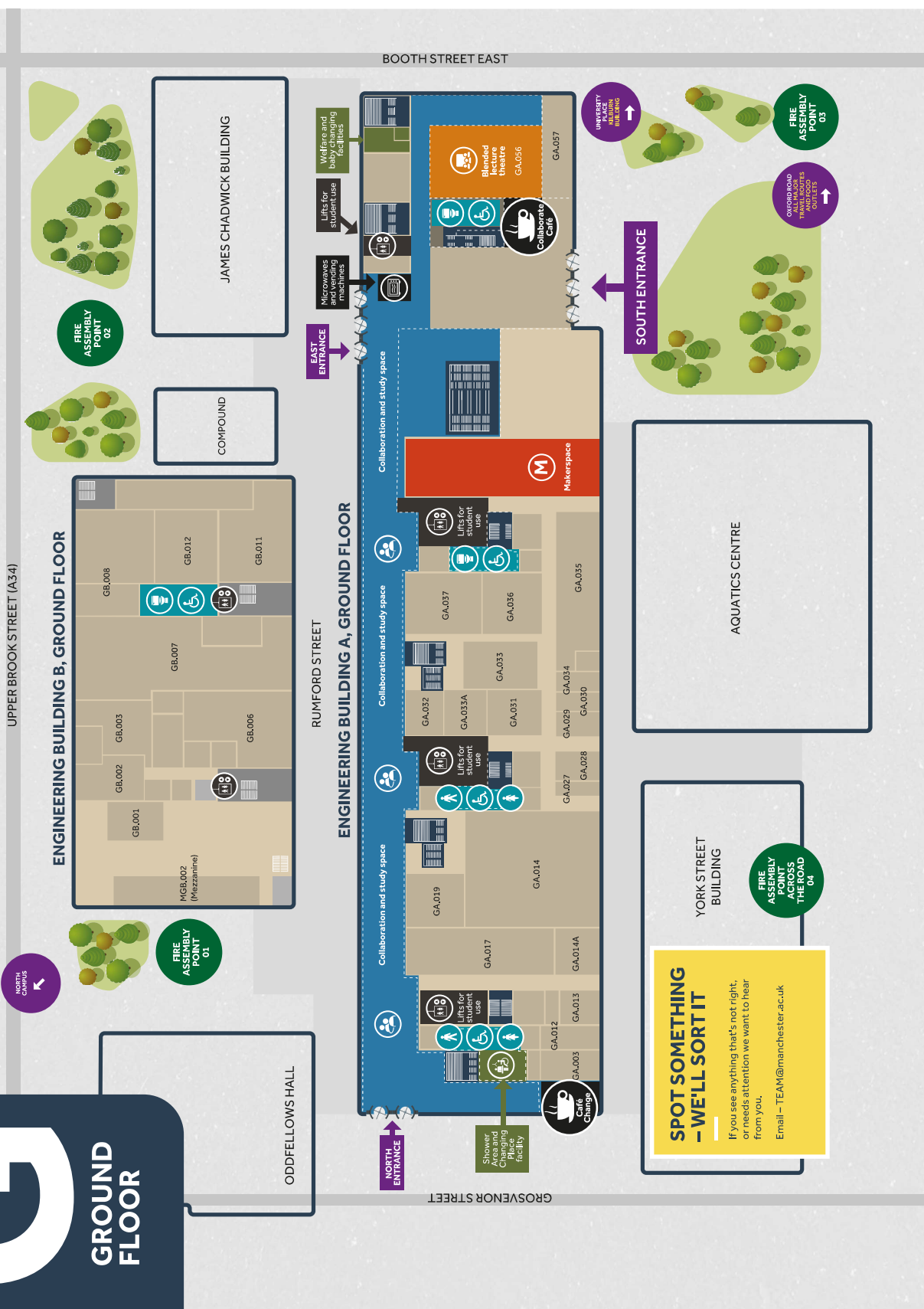


OPENING HOURS
 For building opening hours, visit our Instagram page @uom_mecd

- Female Toilet
- Male Toilet
- Accessible Toilet
- All Gender Toilet
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- Computer Cluster
- Blended Lecture Theatre
- Tiered Lecture Theatre A
- Tiered Lecture Theatre B
- Workspace
- Collaboration and Study Space
- Informal Study Space
- Swipe card access



GROUND FLOOR



SPOT SOMETHING – WE’LL SORT IT

If you see anything that’s not right, or needs attention we want to hear from you.

Email – TEAM@manchester.ac.uk

Monday 12 June		Tuesday 13 June		Wednesday 14 June		Thursday 15 June		Friday 16 June	
07:00	08:00	07:00	08:00	07:00	08:00	07:00	08:00	07:00	08:00
07:45-08:15 Registration	08:15-08:35 Opening Ceremony	08:30-08:35 Registration	08:30-08:35 Announcements	08:00-12:45 Social Excursion Jodrell Bank Observatory	08:30-08:35 Announcements	08:30-08:35 Registration	08:30-08:35 Announcements	08:30-08:35 Announcements	08:30-08:35 Announcements
08:35-09:00 Plenary - Ruzzene	08:35-09:00 Plenary - Ruzzene	08:35-09:00 Plenary - Assouar	08:35-09:00 Plenary - Assouar	08:00-12:45 Social Excursion Jodrell Bank Observatory	08:35-09:00 Plenary - Yilmaz	08:35-09:00 Plenary - Maurel	08:35-09:00 Plenary - Maurel	08:35-09:00 Plenary - Haberman	08:35-09:00 Plenary - Haberman
09:00-09:15 Org - Deymier	09:00-09:15 Org - Deymier	09:00-09:15 Inv - Yilmaz	09:00-09:15 Inv - Yilmaz	08:00-12:45 Social Excursion Jodrell Bank Observatory	09:15-09:30 Inv - Theocharis	09:00-09:15 Org - Parnell	09:00-09:15 Org - Parnell	09:00-09:15 Org - Sanchez-Dehesa	09:00-09:15 Org - Sanchez-Dehesa
09:15-09:30 Inv - Theocharis	09:15-09:30 Inv - Theocharis	09:15-09:30 Inv - Abraham	09:15-09:30 Inv - Abraham	08:00-12:45 Social Excursion Jodrell Bank Observatory	09:30-09:45 Inv - Brun	09:15-09:30 Inv - Willis	09:15-09:30 Inv - Willis	09:15-09:30 Inv - Fleury	09:15-09:30 Inv - Fleury
09:30-09:45 Inv - Gonnella	09:30-09:45 Inv - Gonnella	09:30-09:45 Inv - Brun	09:30-09:45 Inv - Brun	08:00-12:45 Social Excursion Jodrell Bank Observatory	09:45-10:00 Inv - Kadlic	09:30-09:45 Inv - Shmuel	09:30-09:45 Inv - Shmuel	09:45-10:00 Inv - Pennec	09:45-10:00 Inv - Pennec
09:45-10:00 Inv - Lemoult	09:45-10:00 Inv - Lemoult	09:45-10:00 Inv - Kadlic	09:45-10:00 Inv - Kadlic	08:00-12:45 Social Excursion Jodrell Bank Observatory	10:00-10:15 Inv - Guemtau	09:45-10:00 Inv - Nassar	09:45-10:00 Inv - Nassar	10:00-10:15 Inv - Hladky	10:00-10:15 Inv - Hladky
10:00-10:40 Break (40 mins)	10:00-10:40 Break (40 mins)	10:00-10:15 Inv - Guemtau	10:00-10:15 Inv - Guemtau	08:00-12:45 Social Excursion Jodrell Bank Observatory	10:15-10:50 Break (35 mins)	10:00-10:15 Inv - Assier	10:00-10:15 Inv - Assier	10:15-10:30 Inv - Memoli	10:15-10:30 Inv - Memoli
10:45-10:50 Richard Curry	10:45-10:50 Richard Curry	10:15-10:50 Break (35 mins)	10:15-10:50 Break (35 mins)	08:00-12:45 Social Excursion Jodrell Bank Observatory	10:55-11:35 2021 Bloch Lecture Sheng	10:30-10:55 Break (25 mins)	10:30-10:55 Break (25 mins)	10:30-10:55 Break (30 mins)	10:30-10:55 Break (30 mins)
10:50-11:30 2021 Brillouin Lecture Alu	10:50-11:30 2021 Brillouin Lecture Alu	10:55-11:35 2021 Bloch Lecture Sheng	10:55-11:35 2021 Bloch Lecture Sheng	08:00-12:45 Social Excursion Jodrell Bank Observatory	11:35-12:00 Plenary - Wegener	11:00-11:25 Distinguished Lecture Pendry	11:00-11:25 Distinguished Lecture Pendry	11:05-11:45 Young Investigator Bilal	11:05-11:45 Young Investigator Bilal
11:30-11:45 Org - Sotomayor	11:30-11:45 Org - Sotomayor	11:35-12:00 Plenary - Wegener	11:35-12:00 Plenary - Wegener	08:00-12:45 Social Excursion Jodrell Bank Observatory	12:00-12:15 Org - Craster	11:25-11:50 Distinguished Lecture Sheng	11:25-11:50 Distinguished Lecture Sheng	11:45-12:00 Org - Ummova	11:45-12:00 Org - Ummova
11:45-12:00 Inv - Thevamaran	11:45-12:00 Inv - Thevamaran	12:00-12:15 Org - Craster	12:00-12:15 Org - Craster	08:00-12:45 Social Excursion Jodrell Bank Observatory	12:15-12:30 Inv - P Wang	11:50-12:30 Panel Discussion	11:50-12:30 Panel Discussion	12:00-12:15 Inv - Matsuda	12:00-12:15 Inv - Matsuda
12:00-12:15 Inv - Y Jin	12:00-12:15 Inv - Y Jin	12:15-12:30 Inv - P Wang	12:15-12:30 Inv - P Wang	08:00-12:45 Social Excursion Jodrell Bank Observatory	12:30-12:45 Inv - Krushynska	12:00-12:30 Lunch (75 mins)	12:00-12:30 Lunch (75 mins)	12:15-12:30 Inv - Tortello	12:15-12:30 Inv - Tortello
12:15-12:30 Inv - Pagnoux	12:15-12:30 Inv - Pagnoux	12:30-12:45 Inv - Krushynska	12:30-12:45 Inv - Krushynska	08:00-12:45 Social Excursion Jodrell Bank Observatory	12:45-14:05 Lunch (75 mins)	12:45-14:05 Lunch (75 mins)	12:45-14:05 Lunch (90 mins)	12:30-13:25 Lunch (55 mins)	12:30-13:25 Lunch (55 mins)
12:30-13:45 Lunch (75 mins)	12:30-13:45 Lunch (75 mins)	12:45-14:05 Lunch (75 mins)	12:45-14:05 Lunch (75 mins)	08:00-12:45 Social Excursion Jodrell Bank Observatory	14:10-14:50 2021 Phononics Young Investigator Ma	13:00-13:30 Lunch (75 mins)	13:00-14:00 Lunch and Poster session (90 mins)	13:00-13:25 Lunch (55 mins)	13:00-13:25 Lunch (55 mins)
13:50-14:15 Plenary - Kessissoglou	13:50-14:15 Plenary - Kessissoglou	14:10-14:50 2021 Phononics Young Investigator Ma	14:10-14:50 2021 Phononics Young Investigator Ma	08:00-12:45 Social Excursion Jodrell Bank Observatory	14:50-15:15 Plenary - Laude	13:35-14:00 Plenary - Nomura	14:00-14:15 Inv - Termentzidis	14:05-14:45 2023 Bloch Prize Deymier	14:05-14:45 2023 Bloch Prize Deymier
14:15-14:30 Inv - Juhl	14:15-14:30 Inv - Juhl	14:50-15:15 Plenary - Laude	14:50-15:15 Plenary - Laude	08:00-12:45 Social Excursion Jodrell Bank Observatory	15:15-15:30 Org - Y Wu	14:00-14:15 Inv - Termentzidis	14:15-14:30 Inv - Masaita	14:45-15:00 Org - Hussein	14:45-15:00 Org - Hussein
14:30-14:45 Inv - Benchabane	14:30-14:45 Inv - Benchabane	15:15-15:30 Org - Y Wu	15:15-15:30 Org - Y Wu	08:00-12:45 Social Excursion Jodrell Bank Observatory	15:30-15:45 Inv - Phani	14:15-14:30 Inv - Repearaz	14:30-14:45 Inv - Repearaz	15:00-15:15 Inv - Leamy	15:00-15:15 Inv - Leamy
14:45-15:00 Inv - Portela	14:45-15:00 Inv - Portela	15:30-15:45 Inv - Phani	15:30-15:45 Inv - Phani	08:00-12:45 Social Excursion Jodrell Bank Observatory	15:45-16:00 Inv - Fytas	14:35-14:50 Break (30 mins)	14:45-15:15 Break (30 mins)	15:15-15:30 Inv - Lombard	15:15-15:30 Inv - Lombard
15:00-15:15 Inv - S tankey	15:00-15:15 Inv - S tankey	15:45-16:00 Inv - Fytas	15:45-16:00 Inv - Fytas	08:00-12:45 Social Excursion Jodrell Bank Observatory	16:00-16:15 Inv - Tol	15:20-15:45 Plenary - Li	15:20-15:45 Plenary - Li	15:30-15:45 Inv - Maitack	15:30-15:45 Inv - Maitack
15:15-15:30 Inv - Yousefzadeh	15:15-15:30 Inv - Yousefzadeh	16:00-16:15 Inv - Tol	16:00-16:15 Inv - Tol	08:00-12:45 Social Excursion Jodrell Bank Observatory	16:15-16:30 Conference Photograph 1	15:45-16:00 Org - Bonello	15:45-16:00 Org - Bonello	15:45-16:00 Inv - Frazier	15:45-16:00 Inv - Frazier
15:30-15:45 Inv - Nough	15:30-15:45 Inv - Nough	16:15-16:30 Conference Photograph 1	16:15-16:30 Conference Photograph 1	08:00-12:45 Social Excursion Jodrell Bank Observatory	16:30-16:45 Break (25 mins)	16:00-16:15 Org - Djafari Rouhani	16:00-16:15 Org - Djafari Rouhani	16:00-16:15 Inv - JK Yang	16:00-16:15 Inv - JK Yang
15:45-16:00 Inv - Banerjee	15:45-16:00 Inv - Banerjee	16:30-16:45 Break (25 mins)	16:30-16:45 Break (25 mins)	08:00-12:45 Social Excursion Jodrell Bank Observatory	16:45-17:00 Inv - Roca	16:15-16:30 Inv - Torrent	16:15-16:30 Inv - Torrent	16:15-16:30 Inv - Rostami	16:15-16:30 Inv - Rostami
16:00-16:35 Break (35 mins)	16:00-16:35 Break (35 mins)	16:30-16:45 Break (25 mins)	16:30-16:45 Break (25 mins)	08:00-12:45 Social Excursion Jodrell Bank Observatory	17:00-17:15 Inv - Romero-Garcia	16:30-16:45 Inv - Palermo	16:30-16:45 Inv - Palermo	16:30-16:45 Inv - Rostami	16:30-16:45 Inv - Rostami
16:40-18:30 18 Contributed talks 2 Parallel Sessions Topological Phononics Temp. Mod. Phononics Applied Phononics	16:40-18:30 18 Contributed talks 2 Parallel Sessions Topological Phononics Temp. Mod. Phononics Applied Phononics	16:45-17:00 Inv - Roca	16:45-17:00 Inv - Roca	08:00-12:45 Social Excursion Jodrell Bank Observatory	17:15-17:15 Adjourn	16:45-17:00 Inv - Roca	16:45-17:00 Inv - Roca	16:45-17:00 Inv - Rostami	16:45-17:00 Inv - Rostami
18:30 Adjourn	18:30 Adjourn	17:00-17:15 Inv - Romero-Garcia	17:00-17:15 Inv - Romero-Garcia	08:00-12:45 Social Excursion Jodrell Bank Observatory	17:15-18:00 Drinks Reception	17:00-17:15 Adjourn	17:00-17:15 Adjourn	16:45-17:00 Conference Photograph 2	16:45-17:00 Conference Photograph 2
18:45-20:30 Welcome Drinks Reception Manchester Museum	18:45-20:30 Welcome Drinks Reception Manchester Museum	17:15-18:00 Drinks Reception	17:15-18:00 Drinks Reception	08:00-12:45 Social Excursion Jodrell Bank Observatory	18:00-19:00 General Interest Lecture - Cox	17:15-18:00 Drinks Reception	17:15-18:00 Drinks Reception	17:00-18:30 Early Career Researcher Event	17:00-18:30 Early Career Researcher Event
19:00-20:00 20 Contributed talks 2 Parallel Sessions Nonlinear Phononics Phononic Metasurfaces Phononic Crystals Acoustic metamaterials	19:00-20:00 20 Contributed talks 2 Parallel Sessions Nonlinear Phononics Phononic Metasurfaces Phononic Crystals Acoustic metamaterials	18:00-19:00 General Interest Lecture - Cox	18:00-19:00 General Interest Lecture - Cox	08:00-12:45 Social Excursion Jodrell Bank Observatory	18:35 Adjourn	18:00-19:00 General Interest Lecture - Cox	18:00-19:00 General Interest Lecture - Cox	18:30 Adjourn	18:30 Adjourn
19:30-20:00 Drink Reception Christies Bistro	19:30-20:00 Drink Reception Christies Bistro	18:35 Adjourn	18:35 Adjourn	08:00-12:45 Social Excursion Jodrell Bank Observatory	19:30-20:00 Conference Dinner (Whitworth Hall, Oxford Road)	18:35 Adjourn	18:35 Adjourn	19:00-19:00 Adjourn	19:00-19:00 Adjourn
20:00-21:00 21:00-22:00 22:00-23:00	20:00-21:00 21:00-22:00 22:00-23:00	19:30-20:00 Conference Dinner (Whitworth Hall, Oxford Road)	19:30-20:00 Conference Dinner (Whitworth Hall, Oxford Road)	08:00-12:45 Social Excursion Jodrell Bank Observatory	20:00-end	19:30-20:00 Conference Dinner (Whitworth Hall, Oxford Road)	19:30-20:00 Conference Dinner (Whitworth Hall, Oxford Road)	20:00-20:00 Adjourn	20:00-20:00 Adjourn
21:00-22:00 22:00-23:00	21:00-22:00 22:00-23:00	20:00-end	20:00-end	08:00-12:45 Social Excursion Jodrell Bank Observatory	20:00-end	20:00-end	20:00-end	21:00-21:00 Adjourn	21:00-21:00 Adjourn
22:00-23:00	22:00-23:00	20:00-end	20:00-end	08:00-12:45 Social Excursion Jodrell Bank Observatory	20:00-end	20:00-end	20:00-end	22:00-22:00 Adjourn	22:00-22:00 Adjourn
23:00	23:00	20:00-end	20:00-end	08:00-12:45 Social Excursion Jodrell Bank Observatory	20:00-end	20:00-end	20:00-end	23:00-23:00 Adjourn	23:00-23:00 Adjourn

CONTRIBUTED TALKS						
MONDAY A1b		Room 2A.040	MONDAY A1b		Room 2B.020	
16:40-16:52	De Ponti	Jacopo	TOPOLOGICAL PHONONICS	Tessier	Sarah	TEMPORALLY MODULATED PHONONICS
16:52-17:04	Ma	Jihong Aafia		Brothelande	Antonio	
17:04-17:16	Rosa	Matheus		Gliozzi	Emanuele	
17:16-17:28	Wiltshaw	Richard		Riva	Anuj Kumar	
17:28-17:40	Florez	Omar		Dhiman	Andrew	APPLIED PHONONICS
17:40-17:52	Hatanka	Daiki		Hall	Vicente	
17:52-18:04	Achilleos	Vassos		Cutanda Henriquez	Armin	
18:04-18:16	Otsuka	Paul		Kianfar	Gao	
18:16-18:28	Iglesias Martínez	Julio Andrés		Feng	Ricardo	
				Alcorta Galvan		
TUESDAY A2b		Room 2A.040	TUESDAY A2b		Room 2B.020	
17:00-17:12	Smith	Elizabeth	NONLINEAR PHONONICS	Dass	Chandriker	PHONONIC CRYSTALS
17:12-17:24	Bae	Myung Hwan		Graczykowski	Bartlomiej	
	Ioannou					
17:24-17:36	Sougleridis	Ioannis		Marburg	Steffen	ACOUSTIC METAMATERIALS
17:36-17:48	Alu	Andrea	PHONONIC METASURFACES	Calius	Emilio	
17:48-18:00	Bosia	Federico		Clarke	Claudia	
18:00-18:12	Lee	Sung-Won		Rosafalco	Luca	
18:12-18:24	Dorn	Charles		Skvortsov	Alex	
18:24-18:36	Muhammad	Muhammad		Zhang	Quan	
FRIDAY A5a		Room 2A.040		FRIDAY A5a		Room 2B.020
13:30-13:42	Kisil	Anastasia	MATHEMATICS FOR PHONONICS	Geng	Zhuoran	THERMAL PHONONS
13:42-13:54	Bhatt	Abhigna		Beardo	Albert	
13:54-14:06	Touboul	Marie		Ordonez-Miranda	Jose	
14:06-14:18	Vial	Benjamin		Roshdy	Mohamed Eid	
14:18-14:30	Davies	Bryn		Röntgen	Malte	ACOUSTIC METAMATERIALS
14:30-14:42	Lazaro	Mario		Keogh	Melanie	
14:42-14:54	Morini	Lorenzo		Meng	Yang	
14:54-15:06	Liang	Yu-Jui		Giannini	Daniele	
15:06-15:18	Hales Swift	Stephen		Fossat	Pascal	
15:18-15:30	Xu	Changqing		Reda	Jana	

CONTRIBUTED POSTER SESSION		POSTER NUMBER	
THURSDAY 12.30-14.00			
EVENT SPACE 3			
Kogani	Ali	1	<i>Nonlinear Phononics</i>
Kamruzzaman	Md	17	
Paliovaivos	Apostolos	23	
Jang	Sang Vin	3	<i>Phononic Metasurfaces</i>
Shin	YeJeong	32	
Korkiamaki	Tatu Antti Santeri	4	<i>Phononic Crystals</i>
Gattin	Max	8	
Beoletto	Paolo Han	14	
Nistri	Fabio	20	
Patino	Nicholas	24	
Diaz	Jon Canosa	33	
Belahurau	Yauheni	43	
Das	Rishab	5	
Adham	Ali Ishan	6	
Cominelli	Sebastiano	7	
Kim	Gihyun	10	<i>Acoustic Metamaterials</i>
Vasconcelos	Ana	12	
Saatchi	Daniel	13	
Panda	Susmita	28	
Patro	Somya Ranjan	29	
Sethi	Muskaan	31	
Piva	Paulo Sergio	37	
Rodriguez Gomez	Sara Elena	41	
Poulous	Markos	15	
Ma	Jihong Aafia	16	
Rawte	Prajit	38	<i>Thermal Phonons</i>
Kim	Namjeong	18	
Clark	Monty Edward	22	<i>Applied Phononics</i>
Harris	Adam	39	
Hales Swift	Stephen	40	
Krasikova	Mariia	42	
Djafari Rouhani	Bahram	21	
Lee	Myung-Joon	27	<i>Topological Phononics</i>

Scientific Programme

Monday 12th June

M1a [MECD, Main Lecture Theatre A (2A.040)]

08:15-08:35 Opening Ceremony

Topological Phononics

08:35-09:00	Plenary	Dynamics of Modulated Media and Acoustic Temporal Metagratings <u>M. Ruzzene</u>
09:00-09:15	Organisers' Colloquium	Topological Acoustics Sensing P.A. Deymier, Trevor D. Lata, M. Arif Hasan, Keith Runge
09:15-09:30	Invited	Topological Mechanical Metamaterials Revealed By Higher-order Coordinate Transformations F. Allein, A. Anastasiadis, R. Chaunsali, I. Frank, N. Boechler, F. Diakonov, <u>G. Theocharis</u>
09:30-09:45	Invited	Topologically Polarized Maxwell Lattices: beyond the Kagome Paradigm M. Charara, <u>S. Gonella</u>
09:45-10:00	Invited	Guided Waves in Soft Elastomers: Non-Linear Control and Topological Properties A. Delory, <u>F. Lemoult</u> , M. Lanoy, A. Eddi, C. Prada

[MECD, Event Space 3]

10:00-10:40 Break

M1b [MECD, Main Lecture Theatre A (2A.040)]

10:45-10:50 Prof. Richard Curry, Dean of Research, Faculty of Science and Engineering, University of Manchester

Topological Phononics

10:50-11:30	2021 Brillouin	Non-Reciprocal and Topological Phononics <u>A. Alu</u> , R. Fleury, D. Sounas
11:30-11:45	Organisers' Colloquium	Towards Phononic Circuits: Components and Signal Protection <u>C.M. Sotomayor Torres</u> , G. Madiot, R.C. Ng, D. Navarro-Urrios, G. Arregui, M. Albrechtsen, O. Florez, A. Martinez, S. Stobbe, P.D. Garcia, J. Ahopelto
11:45-12:00	Invited	Non-Hermitian Elastodynamic Metamaterials A. Gupta, A. Kurnosov, T. Kottos, <u>R. Thevamaran</u>
12:00-12:15	Invited	Topological states in Hermitian and non-Hermitian beams <u>Y. Jin</u> , L. He, W. Wang, R. Cai, W. Zhong, X. Zhuang, T. Rabczuk, Y. Pennec, B. Djafari-Rouhani
12:15-12:30	Invited	Invisibility of Defects in Chiral and Mirror Symmetric Networks A. Coutant, L.Y. Zheng, V. Achilleos, O. Richoux, G. Theocharis, <u>V. Pagneux</u>

[MECD, Event Space 3]

12:30-13:45 Lunch

A1a [MECD, Main Lecture Theatre A (2A.040)]

Applied Phononics

- | | | |
|-------------|---------|--|
| 13:50-14:15 | Plenary | Acoustic Coatings for Maritime Applications
C. Lin, G.S. Sharma, A. Skvortsov, I. MacGillivray, N. Kessissoglou |
| 14:15-14:30 | Invited | Flow Transition Delay by Multi-Input Multi-Output Phononic Subsurface
C.L. Willey, C.J. Barnes, V.W. Chen, K. Rosenberg, A. Medina, A.T. Juhl, |
| 14:30-14:45 | Invited | Hybridizing Surface Acoustic Waves and Mechanical Resonators for Phononic Information Processing
S. Benchabane, M. Baranski, R. Chacon, J. Chatellier, J.-M. Friedt, A. Khelif |
| 14:45-15:00 | Invited | Leveraging and Tuning Acoustic-Wave Propagation in Micro-Architected Materials
R. Sun, Y. Kai, T. Pezeril, W. DeLima, C.M. Portela |
| 15:00-15:15 | Invited | Realizing Beyond-Nearest-Neighbour Coupling in Acoustic and Elastic Metamaterials on a Benchtop Scale
T.A. Starkey, D.B. Moore, I.R. Hooper, J.R. Sambles, A.P. Hibbins, G.J. Chaplain |

Temporally Modulated Phononics

- | | | |
|-------------|---------|---|
| 15:15-15:30 | Invited | Dynamics of Spatiotemporally Modulated Materials
B. Yousefzadeh |
| 15:30-15:45 | Invited | Temporally Modulated Phase Gradient Systems: Towards Frequency-selective Acoustic Wave Beaming
M. Moghaddaszadeh, R. Adlakha, M.A. Attarzadeh, A. Aref, M. Nouh |
| 16:00-16:00 | Invited | Nonreciprocal Metamaterial from Piezo-electric Sensing and Actuation
A. Banerjee, K.K. Bera |

[MECD, Event Space 3]

16:00-16:35 Break

A1a [MECD, Main Lecture Theatre A (2A.040)]

Topological Phononics

16:40-16:52	Contributed	Tailored Protected Edge Waves via Chiral Hierarchical Metamaterials <u>J.M. De Ponti</u> , L. Iorio, G.J. Chaplain, A. Corigliano, R.V. Craster, R. Ardito
16:52-17:04	Contributed	Topological Edge States in Su-Schrieffer-Heeger Phononic Crystals: An Experimental Study A.R. Alisepahi, K. Sun, <u>J. Ma</u>
17:04-17:16	Contributed	Interface States in Dimerized Quasicrystal Lattices with Broken Inversion Symmetry <u>M.I.N. Rosa</u> , D. Beli, L. Lomazzi, C.M. Junior, M. Ruzzene
17:16-17:28	Contributed	Analytical Solutions for Bloch Waves and Topological Mode Steering in a Meta-Plate <u>R. Wiltshaw</u> , J.M. De Ponti, R.V. Craster
17:28-17:40	Contributed	A Topological Phononic Waveguide Above 10 GHz <u>O. Florez</u> , M. Poblet, S. Pourjamal, J. Ahopelto, C.M. Sotomayor-Torres
17:40-17:52	Contributed	Control of Ultrahigh Frequency Phonon Transport in Valley Topological Ring Resonator-Waveguide Systems <u>D. Hatanaka</u> , H. Takeshita, M. Kataoka, M. Misaawa, H. Okamoto, H. Yamaguchi, and K. Tsuruta
17:52-18:04	Contributed	Experiments in an exact acoustic analogue of the Hatano-Nelson model A. Maddi , <u>V. Achilleos</u> , G. Penelet, V. Pagneux, Y. Aurégan
18:04-18:16	Contributed	Imaging a Topological Phononic Crystal in Real and k-Space <u>P.H. Otsuka</u> , K. Nishimata ¹ , M. Tomoda ¹ , D. Hatanaka, H. Yamaguchi, K. Tsuruta, O. Matsuda
18:16-18:28	Contributed	Non-Hermitian topological disclination defect in a valley-Hall sonic lattice <u>J.A. Iglesias Martínez</u> , R. Pernas, M. Kadic, J. Christensen

A1a [MECD, Blended Lecture Theatre (2B.020)]

Temporally Modulated Phononics

16:40-16:52	Contributed	Experimental study of piezoelectric phononic crystals with space-time modulation in the sub-sonic and sonic regimes <u>S. Tessier Brothelande</u> , C. Croënne, F. Allein, J.O. Vasseur, B. Dubus
16:52-17:04	Contributed	Tunable topological edge-modes in photo-responsive periodic structures G.J. Chaplain, <u>A.S. Gliozzi</u> , B. Davies, D. Urban, F. Bosia, R.V. Craster
17:04-17:16	Contributed	Surface to Bulk Conversion of Elastic Waves by Temporal Modulation J. Santini, X. Pu, A. Palermo, F. Braghin, <u>E. Riva</u>
17:16-17:28	Contributed	Frequency- and Momentum-Resolved Detection of Laser-Excited Acoustic Phonons in Nanomembranes T. Vasileiadis, <u>A. Kumar Dhiman</u> , K. Sympoura, M. Pochylski, B. Graczykowski

Applied Phononics

17:28-17:40	Contributed	Multiple layers, phononic arrays and surface variations to suppress the bending wave coincidence effect in panels <u>A. Hall</u> , G. Schmid, V. Sorokin, G. Dodd
17:40-17:52	Contributed	Phononic Crystal and Resonator-Based Metasurface Combination for Wide-Angle Sound Absorption D.M. Garza-Agudelo, <u>V. Cutanda Henríquez</u> , C.-H. Jeong, P.R. Andersen, M. Ibarias, J. Sánchez-Dehesa, F. Lucklum
17:52-18:04	Contributed	Local flow stabilization/destabilization by phononic sub-surfaces over an extended spatial domain <u>A. Kianfar</u> , M.I. Hussein
18:04-18:16	Contributed	Locally Resonant Phononic biosensors A. Khelif, <u>F. Gao</u> , S. Benchabane, A. Bermak
18:16-18:28	Contributed	Application of Periodic Electrical Boundary Conditions as a Means of Achieving Tunable RF SAW Devices <u>R. Alcorta Galván</u> , C. Croënne, B. Dubus, B. Loiseaux, E. Eustache, M. Bertrand, A.-C. Hladky

Scientific Programme

Tuesday 13th June

M2a [MECD, Main Lecture Theatre A (2A.040)]

08:30-08:35

Announcements

Acoustic Metamaterials

08:35-09:00

Plenary

Phononic Skyrmions: a new horizon to structure acoustic and elastic waves?

B. Assouar, L. Cao, S. Wan, Y. Zeng, Y. Zhu

09:00-09:15

Invited

Ultrawide Phononic Band Gaps

C. Yilmaz

09:15-09:30

Invited

Acoustic Wave Propagation through Resonant Meta-Materials; an Asymptotic Analysis

I.D. Abrahams, M.J.A. Smith

09:30-09:45

Invited

Lamb waves in discrete waveguides: unidirectional waves and mechanical switching networks

G. Carta, M.J. Nieves, M. Brun

09:45-10:00

Invited

Shape Morphing and Elastic waves in Metamaterials

L. Wang, K. Dudek, J. Iglesias, G. Ulliac, V. Laude, M. Kadic,

10:00-10:15

Invited

Active Thermal Cloaking

M. Cassier, T. DeGiovanni, S. Guenneau, F. Guevara Vasquez

[MECD, Event Space 3]

10:15-10:50

Break

M2b [MECD, Main Lecture Theatre A (2A.040)]

Phononic Crystals

10:55-11:35

2021 Bloch

Causality and the Development of Tunable Acoustic Metamaterial Absorbers

P. Sheng

11:35-12:00

Plenary

Roton-like Dispersion Relations in Designed Elastic Crystals

M. Wegener

12:00-12:15

Organisers' Colloquium

Phononic crystals for elastic wave control

R.V. Craster

12:15-12:30

Invited

Drawing Dispersion Curves: Band Customization by Non-local Phononic Crystals

A. Kazemi, K.J. Deshmukh, F. Chen, S. Paul, B. Deng, H.C. Fu, P. Wang

12:30-12:45

Invited

Acoustic Wave Steering in Disordered Networks by Rational Pruning

A.O. Krushynska, M. van Hecke

[MECD, Event Space 3]

12:45-14:05 Lunch

A2a [MECD, Main Lecture Theatre A (2A.040)]

Phononic Crystals

14:05-14:50	2021 Phononics YIA	Non-Hermitian Extended Topological Modes <u>G. Ma</u>
14:50-15:15	Plenary	Guided Waves in Glide-Reflection Symmetric Phononic Crystal Interfaces J.A Iglesias, N. Laforge, M. Kadic ¹ , E. Prodan, <u>V. Laude</u>
15:15-15:30	Organisers' Colloquium	From Effective Medium Theory to Acoustic Double-Zero-Index Materials K. Lyu, C. Xu, M. Farhat, G. Ma, Y. Lai, <u>Y. Wu</u>
15:30-15:45	Invited	Dissipation Driven Bloch Wave Degeneracies <u>A.S. Phani</u>
15:45-16:00	Invited	Hypersonic Metamaterials Based on Architected Hybrid Colloids Y. Cang, R. Sainidou, P. Rembert, K. Matyjaszewski, M.R. Bockstaller, B. Graczykowski, <u>G. Fytas</u>
16:00-16:15	Invited	Subwavelength Imaging of Flexural Waves Beyond the Diffraction Limit H. Danawe, <u>S. Tol</u>

[MECD, Staircase, Outside 1st Floor entrance to Main Lecture Theatre A (2A.040)]

16:15-16:30 Conference Photograph 1

[MECD, Event Space 3]

16:30-16:55 Break

A2b [MECD, Main Lecture Theatre A (2A.040)]

Nonlinear Phononics

17:00-17:12	Contributed	Wave Propagation in a Phononic Material with Asymmetric Bilinear Stiffness <u>E.J. Smith</u> , K.H. Matlack
17:12-17:24	Contributed	Tunable Mid Gap in Monoatomic-diatom Convertible Phononic Crystal with Odd-even Alternating Nonlinearity <u>M.H. Bae</u> , S.H. Kim, H.M. Seung, J.H. Oh
17:24-17:36	Contributed	Nonlinear Propagation in 1D and 2D Acoustic Networks <u>I. Ioannou Sougleridis</u> , O. Richoux, V. Achilleos, G. Theocharis, C. Desjoux, D.J. Frantzeskakis

Phononic Metasurfaces

17:36-17:48	Contributed	Hyperbolic Shear Elastodynamic Waves S. Yves, E. Galiffi, E.M. Renzi, X. Ni, <u>A. Alu</u>
17:48-18:00	Contributed	Auxeticity enables tuning of topological waveguiding in metamaterial plates <u>F. Bosia</u> , G. Carta, M. Morvaridi, V.F. Dal Poggetto, A.S. Gliozzi, M. Miniaci, N. Pugno
18:00-18:12	Contributed	Elastic Metasurface for Multi-Modes <u>S.-W. Lee</u> , S.-I. Kim, H.-M. Seung, J.-H. Oh
18:12-18:24	Contributed	Conformally Graded Metamaterials for Wave Attenuation <u>C. Dorn</u> , D.M. Kochmann
18:24-18:36	Contributed	Design and Manufacturing of Monolithic Mechanical Metastructure with Ultrawide Bandgap for Low Frequency Vibration and Noise Control <u>Muhammad</u> , J. Kennedy, C.W. Lim

A2b [MECD, Blended Lecture Theatre (2B.020)]

Phononic Crystals

17:00-17:12	Contributed	Tapered Resonator-Based Phononic Crystal: Avoided Level Crossings, Robust Self-Collimation, and Bi-Refringence D. Das, C.K. Dass, P.J. Shah, R. Bedford, L.R. Ram-Mohan
17:12-17:24	Contributed	Breaking the symmetry: Do imperfect Phononic Crystals work? V. Babacic, M. Sledzinska, T. Vasileiadis, C.M. Sotomayor Torres, B. Graczykowski
17:24-17:36	Contributed	Engineering phononic crystals – always finite and never perfectly periodic S. Marburg, F. Kronowetter

Acoustic Metamaterials

17:36-17:48	Contributed	Vibroacoustic Metamaterial Systems as Transformation Mechanisms: Towards Multi-Scale and Non-Periodicity S.E. Rodriguez, E.P. Calius, A. Hall, R. Das
17:48-18:00	Contributed	Dispersion Behaviour of a Non-Resonant Elastic Metamaterial J.D. Smith, C.L. Clarke
18:00-18:12	Contributed	Reinforcement Learning Guiding the Design Optimization of Graded Metamaterials for Energy Harvesting L. Rosafalco, J.M. De Ponti, L. Iorio, R.V. Craster, R. Ardito, A. Corigliano
18:12-18:24	Contributed	Acoustic Wave Scattering by a Lattice of Scatterers in a Soft Medium: Homogenisation Approach A. Skvortsov, G.S. Sharma, I. MacGillivray, N. Kessissoglou
18:24-18:36	Contributed	Hard-Magnetic Soft Elastic Metamaterials for Tunable Wave Manipulation Q. Zhang, S. Rudykh

Scientific Programme

Wednesday 14th June

A3a [MECD, Main Lecture Theatre A (2A.040)]

Thermal Phonons

12:55-13:35	2023 Brillouin	General Formulation, Computational Method, and Significance of Four-Phonon Scattering <u>X. Ruan</u> , T. Feng
13:35-14:00	Plenary	Behavior of Thermal Phonons in Contrast to Photons M. Nomura,
14:00-14:15	Invited	Phonons and Nanomaterials, New Era <u>K. Termentzidis</u>
14:15-14:30	Invited	Acoustic Phonon Tunneling Across a Vacuum Gap between Piezoelectric Crystals Z. Geng, <u>I.J. Maasilta</u>
14:30-14:45	Invited	Determination of the In-plane Thermal Diffusivity Using Beam-Offset Frequency-Domain Thermoreflectance with a One-Dimensional Optical Heat Source K. Xu, <u>J.S. Reparaz</u>

[MECD, Event Space 3]

14:45-15:15 Break

A3b [MECD, Main Lecture Theatre A (2A.040)]

Phononic Metasurfaces

15:20-15:45	Plenary	Non-reciprocal amplification using Willis coupling <u>J. Li</u> ,
15:45-16:00	Organisers' Colloquium	Localization of Elastic Energy on Metasurfaces with Resonators T. Deletang, A. Noual, R. Buisine, B. Djafari-Rouhani, Y. Pennec, L. Carpentier, <u>B. Bonello</u>
16:00-16:15	Organisers' Colloquium	Focusing and Imaging of Flexural Lamb Waves by Pillared Metasurfaces L. Carpentier, Y. Jin, W. Wang, J. Iglesias, A. Khelif, Y. Pennec, B. Bonello, <u>B. Djafari-Rouhani</u>
16:15-16:30	Invited	Tailoring Bound States in the Continuum by Circular Clusters of Scatterers M. Martí-Sabaté, J. Li, S. Cummer, B. Djafari-Rouhani, <u>D. Torrent</u>
16:30-16:45	Invited	A Multiple Scattering Approach for Elastic Metasurfaces: from Quasi-Periodicity to Space-Time Modulation X. Pu, <u>A. Palermo</u> , A. Marzani
16:45-17:00	Invited	Coupled Resonances Mechanisms to Broaden Low-Frequency Bandgaps in Acoustic Metamaterials <u>D. Roca</u> , G. Sal, D. Yago, J. Cante, J. Oliver, M.I. Hussein
17:00-17:15	Invited	Target scattering properties with correlated disorder <u>S. Kuznetsova</u> , L.M. Garcia-Raffi, J.-P. Groby, V. Romero-García

Scientific Programme

Thursday 15th June

M4a [MECD, Main Lecture Theatre A (2A.040)]

08:30-08:35 Announcements

Mathematics Underpinning Phononics

08:35-09:00	Plenary	Acoustic diffraction grating with space-time modulation <u>A. Maurel</u> , K. Pham
09:00-09:15	Organisers' Colloquium	Emergence of Willis constitutive coupling in elastodynamic heterogeneous media <u>W.J. Parnell</u> , P.A. Cotterill, D. Nigro
09:15-09:30	Invited	Energy Transmission and Reflection at the Boundary of a Composite with Random Microgeometry <u>J.R. Willis</u>
09:30-09:45	Invited	Discrete One-dimensional Models for the Electromomentum Coupling K. Muhafra, M.R. Haberman, <u>G. Shmuel</u>
09:45-10:00	Invited	Strong Passive Willis Coupling P. Brucks, <u>H. Nassar</u>
10:00-10:15	Invited	Wave asymptotics in two-dimensional periodic media <u>R.C. Assier</u> , A. Shanin, A. Korolkov, O. Makarov
10:15-10:30	Invited	Bi-orthogonality Relations in the Waveguide Theory <u>S.V. Sorokin</u> , L.S. Ledet

[MECD, Event Space 3]

10:30-10:55 Break

M4a [MECD, Main Lecture Theatre A (2A.040)]

Distinguished Speaker Session

11:00-11:25	Distinguished	Waves in Time-Dependent Systems <u>J. Pendry</u>
11:25-11:50	Distinguished	Underwater Acoustic Absorption by Using Impedance Matched Composites <u>P. Sheng</u>
11:50-12:30		Panel Discussion

[MECD, Event Space 3]

12:30-14:00 Lunch and Poster Session

[MECD, Event Space 3]

Nonlinear Phononics

- | | | |
|-------------|-----------|---|
| 12:30-14:00 | Poster 1 | Phase Nonreciprocity in a Periodic Material with a Non-linear Asymmetric Unit Cell
<u>A. Kogani</u> , B. Yousefzadeh |
| 12:30-14:00 | Poster 17 | Contact Stiffness Evaluation and Wave Response Study of Engineered Contact-Based Nonlinear Phononic Material
<u>M. Kamruzzaman</u> , G.U. Patil, K.H. Matlack |
| 12:30-14:00 | Poster 23 | Non-Linear Waves in Bistable Mechanical Metamaterials and Transition Waves
<u>A. Paliovaivos</u> , V. Achilleos, G. Theocharis, V. Tournat, N. Stefanou |

Phononic Metasurfaces

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|-------------|-----------|--|
| 12:30-14:00 | Poster 3 | Asymmetric Elastic Metasurface between Different Media
S.V. Jang, S.W. Lee, J.-H. Oh |
| 12:30-14:00 | Poster 32 | Fluid-like Elastic Metasurface
<u>Y.-J. Shin</u> , H.-M. Seung, J.-H. Oh |

Phononic Crystals

- | | | |
|-------------|-----------|---|
| 12:30-14:00 | Poster 4 | Controlling Thermal Transport with Pillar-Based Phononic Crystals
<u>T.A.S. Korkiamäki</u> , T.A. Puurtinen, T. Loippo, I.J. Maasilta |
| 12:30-14:00 | Poster 8 | Characterization of biphasic architected media towards ultrasound monitoring applications
<u>M. Gattin</u> , N. Bochud, G. Rosi, Q. Grossman, D. Ruffoni, S. Naili |
| 12:30-14:00 | Poster 14 | Design and characterization of Snell Lenses with Gradient Index Phononic Crystals
<u>P.H. Beoletto</u> , Fabio Nistri, Antonio S. Gliozzi, Federico Bosia, |
| 12:30-14:00 | Poster 20 | Metamaterial-based barriers for railway-generated ground borne vibration
<u>F. Nistri</u> , R.M. Cosentini, V.F. Dal Poggetto, P. Charkaluk, N. Pugno, M. Miniaci, A. Gliozzi, F. Bosia |
| 12:30-14:00 | Poster 24 | Elastic Hyperbolic Strips
<u>N.H. Patino</u> , L. Lomazzi, L. De Beni, M. Ruzzene |
| 12:30-14:00 | Poster 33 | Silicon Based Suspended Thermometry Device Fabrication for Phonon Ballistic and Coherent Regimes Study
<u>J. Canosa Diaz</u> , H. Ikzibane, B. Brisuda, C. Polanco Garcia, L. Saminadayar, N. Mingo, O. Bourgeois, E. Dubois, J.-F. Robillard |
| 12:30-14:00 | Poster 43 | Design of a Phononic-Fluidic Cavity Sensor: Influence of Finite Size Lattice on Sensor Performance
<u>Y. Belahurau</u> , F. Lucklum |

Acoustic Metamaterials

12:30-14:00	Poster 5	Metapile: Resonator Impregnated Pile Towards Enhanced Passive Vibration Control <u>R. Das</u> , A. Banerjee, B. Manna
12:30-14:00	Poster 6	Acoustic attenuation bands using graded metamaterials <u>A.I. Adham</u> , V. Sorokin, B. Mace, A. Hall
12:30-14:00	Poster 7	Weight Reduction Strategies for Underwater Acoustic Cloaking <u>S. Cominelli</u> , D.E. Quadrelli, G. Cazzulani, F. Braghin
12:30-14:00	Poster 10	Full Ultrasound Transmission in the Metal-Water-Metal System using Elastic Metamaterials <u>G. Kim</u> , J. Lee, J.H. Cho, M. Kweun, Y.Y. Kim
12:30-14:00	Poster 12	Multi-Objective Design Optimization of a Metamaterial-Based Interface <u>A.C.A. Vasconcelos</u> , A.M. Aragon, D.L. Schott, J. Jovanova
12:30-14:00	Poster 13	Data Driven Geometric Design of Biomimetic Minimal Surface Metamaterial for Elastic to Acoustic Band Gaps <u>D. Saatchi</u> , I.-K. Oh
12:30-14:00	Poster 28	Vibration Control of Beams under the Action of Moving Loads using Inertial Amplifier <u>S. Panda</u> , A. Banerjee, B. Manna
12:30-14:00	Poster 29	Flexural wave propagation of Metamaterial inspired Rigid Elastic metastructures <u>S.R. Patro</u> , A. Banerjee, G.V. Ramana
12:30-14:00	Poster 31	Vibration attenuation in a mass in mass frictional meta-material: An analytical investigation <u>M. Sethi</u> , A. Banerjee, B. Manna
12:30-14:00	Poster 37	Mathematical Model for Layered Acoustic Materials with Random Particulate Microstructure <u>P.S. Piva</u> , K.K. Napal, A.L. Gower
12:30-14:00	Poster 41	Automated design of multiscale mechanical metamaterials <u>S.E. Rodriguez</u> , R. Das, E.P. Calius

Thermal Phonons

12:30-14:00	Poster 15	Thermal Rectification using Asymmetrically Perforated Graphene <u>M. Poulos</u> , K. Termentzidis
12:30-14:00	Poster 16	Phonon Transport in Defected Bi-Layer Graphene Nanoribbons T. Boriwaye, <u>J. Ma</u>
12:30-14:00	Poster 38	Propagation Characteristics of Narrowband Thermal Phonons under Atomic-scale Local Resonance Conditions <u>A. Beardo</u> , P. Desmarchelier, C.-N. Tsai, P. Rawte, K. Termentzidis, M.I. Hussein

Applied Phononics

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|-------------|-----------|---|
| 12:30-14:00 | Poster 18 | Sensing 6G Communication Ultra-high Frequency Radio Waves via Phononic Crystal
<u>N.J. Kim</u> , Y.J. Shin, S.W. Lee, H.W. Park, M.H. Bae, J.H. Oh |
| 12:30-14:00 | Poster 22 | Apertures for Generating Spatial Superoscillations of Coherent Acoustic Phonons
<u>M.E. Clark</u> , K.A. Benedict, K. Sellami, A.V. Akimov, J. Bailey, R.P. Campion, A.J. Kent |
| 12:30-14:00 | Poster 39 | Design of 3D Printable Phononic Subsurfaces based on Locally Resonant Elastic Metamaterials
<u>A.R. Harris</u> , T. Calascione, J.A.N. Farnsworth, M.I. Hussein |
| 12:30-14:00 | Poster 40 | Phononic Dispersion Coupling as Flowmeter
<u>S. Hales Swift</u> , I.F. El-Kady |
| 12:30-14:00 | Poster 42 | Ventilated periodic structures for broadband noise insulation: design and optimization
<u>M. Krasikova</u> , A. Pavliuk, S. Krasikov, Y. Baloshin, D.A. Powell, S. Marburg, A. Bogdanov |

Topological Phononics

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|-------------|-----------|--|
| 12:30-14:00 | Poster 21 | Flat Band Induced Topological Tamm States in One-Dimensional Comb-like Structures
S. Khattou, Y. Rezzouk, M. Amrani, M. El Ghafiani, E.H. El Boudouti, A. Talbi, Y. Jin, <u>B. Djafari-Rouhani</u> |
| 12:30-14:00 | Poster 27 | Tailoring Valley Displacement in Valley Topological Mechanical Honeycomb Lattice
<u>M.-J. Lee</u> , I.-K. Oh |

A4a [MECD, Main Lecture Theatre A (2A.040)]

Nonlinear Phononics

14:05-14:45	2023 Bloch	Quantum-inspired Acoustic Computing <u>P. Deymier</u>
14:45-15:00	Organisers' Colloquium	Harmonics dispersion relation: Inner makings of a time evolving strongly nonlinear wave <u>M.I. Hussein</u> , R. Khajehtourian
15:00-15:15	Invited	A Perturbation Approach for Interfaced Transmission Between Linear and Nonlinear Monatomic Lattices L. Fang, <u>M.J. Leamy</u>
15:15-15:30	Invited	Effective Dynamics for Low-Amplitude Transient Elastic Waves in a 1D Periodic Array of Non-Linear Interfaces C. Bellis, <u>B. Lombard</u> , M. Touboul, R. Assier
15:30-15:45	Invited	Nonlinear wave propagation through phononic materials with rough contact interfaces G.U. Patil, <u>K.H. Matlack</u>
15:45-16:00	Invited	Mechanical Multi-level Memory J.E. Pechac, <u>M.J. Frazier</u>
16:00-16:15	Invited	Origami-based Metamaterial: A New Type of Versatile Mechanical Waveguide H. Yasuda, Y. Miyazawa, P. Kevrekidis, <u>J. Yang</u>
16:15-16:30	Invited	Acoustogalvanic Effect in Dirac Materials <u>H. Rostami</u>
16:30-16:40		Phononics 2025 Host Announcement

[MECD, Staircase, Outside 1st Floor entrance to Main Lecture Theatre A (2A.040)]

16:40-16:50	Conference Photograph 2
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Scientific Programme

Friday 16th June

M5a [MECD, Main Lecture Theatre A (2A.040)]

08:30-08:35 Announcements

Acoustic Metamaterials

08:35-09:00	Plenary	Non-reciprocal Sound Scattering with Spatiotemporally Modulated Acoustic Metasurfaces <u>M.R. Haberman</u>
09:00-09:15	Organisers' Colloquium	Shannon Entropy as a Characterization Tool in Acoustics <u>J. Sánchez-Dehesa</u>
09:15-09:30	Invited	Nonlocally-Resonant Elastic Metamaterials A. Bossart, <u>R. Fleury</u>
09:30-09:45	Invited	On the Nature of Boundaries and Interfaces in Metamaterials and Phononic Crystals <u>A. Srivastava</u>
09:45-10:00	Invited	Propagation of Elastic Waves in Randomly Distributed Pillars on Metamaterial Phononic Plate <u>Y. Pennec</u> , L. Carpentier, R. Cai, Y. Jin, A. Noual, B. Djafari-Rouhani, T. Deletang, B. Bonello
10:00-10:15	Invited	Design of Metamaterials for Acoustic Stealth Using Optimization Tools L. Roux, C. Croënne, M. Pouille, C. Audoly, <u>A.-C. Hladky</u>
10:15-10:30	Invited	Spherical aberration in a 2D sound delivery system C. Rajguru, <u>G. Memoli</u>

[MECD, Event Space 3]

10:30-11:00 Break

M5a [MECD, Main Lecture Theatre A (2A.040)]

Applied Phononics

11:05-11:45	2023 Phononics YIA	Tunable Nonlinear Magnetic Lattices as a Platform for Controlling Waves <u>O. Bilal</u>
11:45-12:00	Organisers' Colloquium	Sound Attenuation by Pancake structures and Acoustic Black Holes in Linear and Nonlinear regimes <u>O. Umnova</u> , D. Brooke, P. Leclaire, T. Dupont
11:45-12:00	Invited	Optical generation and detection of GHz compression/ dilatation and shear acoustic waves in transparent medium with two-dimensional metallic grating structure <u>O. Matsuda</u> , K. Momiyama, M. Tomoda, G. Vaudel, V. Gusev
12:00-12:15	Invited	Multiscale Mechanical Study of Marine Seashells and Implications in the Design of Bioinspired Structures for Advanced Vibration Control Y. Liu, M. Lott, S.F. Seyyedizadeh, I. Corvaglia, G. Greco, V.F. Dal Poggetto, A.S. Gliozzi, R. Mussat Sartor, N. Nurra, C. Vitale-Brovarone, N.M. Pugno, F. Bosia, <u>M. Tortello</u>

[MECD, Event Space 3]

12:30-13:25 Lunch

A5a [MECD, Main Lecture Theatre A (2A.040)]

Mathematics Underpinning Phononics

13:30-13:42	Contributed	Discrete Helmholtz equation on a square lattice with corners <u>A. Kisil</u>
13:42-13:54	Contributed	Wave Dispersion in Monocoupled System with Inertial Amplifier and Embedded Resonator <u>A.S. Bhatt</u> , <u>A. Banerjee</u>
13:54-14:06	Contributed	High-frequency Homogenization of Dispersive Media <u>M. Touboul</u> , <u>B. Vial</u> , <u>R. Assier</u> , <u>S. Guenneau</u> , <u>R.V. Craster</u>
14:06-14:18	Contributed	Modeling and optimization of discrete phononic lattices <u>B. Vial</u> , <u>R.V. Craster</u>
14:18-14:30	Contributed	Joining the Dots to Understand the Spectral Convergence of Finite-Sized Acoustic Metamaterials <u>H. Ammari</u> , <u>B. Davies</u> , <u>E.O. Hiltunen</u>
14:30-14:42	Contributed	Frequency Spectrum of Sturmian Quasiperiodic Tilings <u>M. Lázaro</u> , <u>A. Niemczynowicz</u> , <u>P. Siemaszko</u> , <u>L.M. García-Raffi</u>

Phononic Crystals

14:42-14:54	Contributed	Negative refraction in canonical quasicrystalline-generated phononic metamaterials <u>Z. Chen</u> , <u>L. Morini</u> , <u>M. Gei</u>
14:54-15:06	Contributed	The Topological Valley Edge State of the Archimedean Tilings Phononic Crystal <u>Y.-J. Liang</u> , <u>P.-J. Guo</u> , <u>D.-H. Jhu</u> , <u>L.-W. Chen</u>
15:06-15:18	Contributed	Principles Underlying 2-D Phononic Pseudocrystal Isolators <u>S. Hales Swift</u> , <u>I.F. El-Kady</u> , <u>R.A. Kellogg</u>
15:18-15:30	Contributed	Broad-angle Coherent Perfect Absorption-Lasing in twodimensional non-Hermitian Phononic Crystals <u>C. Xu</u> , <u>Y. Wu</u>

A5a [MECD, Blended Lecture Theatre (2B.020)]

Thermal Phonons

13:30-13:42	Contributed	Piezoelectrically Mediated Acoustic Phonon Heat Transfer Across a Vacuum Gap <u>Z. Geng</u> , I.J. Maasilta
13:42-13:54	Contributed	Universal Behavior of Highly-Confined Heat Flow in Semiconductor Nanosystems: from nanomeshes to metalat-tices B. McBennett, <u>A. Beardo</u> , E. Nelson, B. Abad, T. Frazer, A. Adak, Y. Esashi, B. Li, H. Kapteyn, M. Murnane, J. Knobloch
13:54-14:06	Contributed	Net heat current at zero mean temperature gradient <u>J. Ordonez-Miranda</u> , R. Anufriev, M. Nomura, S. Volz

Acoustic Metamaterials

14:06-14:18	Contributed	Three-dimensions auxetic metamaterials with tunable ferroelectric properties for guiding elastic waves <u>M. Roshdy</u> , T. Chen, S. Nakhmanson, O.R. Bilal
14:18-14:30	Contributed	Latent Symmetries in Acoustic Systems <u>M. Röntgen</u> , C.V. Morfonios, P. Schmelcher, V. Pagneux
14:30-14:42	Contributed	Dynamically Tunable Metamaterial for Controlling Air-borne Sound in Real-time <u>M. Keogh</u> , M. Kheybari, O.R. Bilal
14:42-14:54	Contributed	Subwavelength Broadband Perfect Absorption for Unidimensional Open-Duct Problems <u>Y. Meng</u> , V. Romero-García, G. Gabard, J.-P. Groby, C. Bricault, S. Goudé
14:54-15:06	Contributed	Efficient analysis of sound insulation in locally resonant metamaterial panels using an effective medium model <u>D. Giannini</u> , E.P.B. Reynders
15:06-15:18	Contributed	Wave propagation characterization of 2D structures through an algebraic identification technique X. Li, M. Ichchou, A. Zine, N. Bouhaddi, <u>P. Fossat</u>
15:18-15:30	Contributed	A Non-Linear Delayed Acoustic Resonator for Mimicking the Hearing Haircells <u>J. Reda</u> , M. Fink, F. Lemoult

[MECD, Event Space 3]

15:30-16:00	Closing Ceremony
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Delegate list

Abrahams, David	University of Cambridge	UK
Achilleos, Vassos	Laboratoire d'Acoustique de l'Université du Mans	France
Adham, Ali Ishan	The University of Auckland	New Zealand
Ahopelto, Jouni	VTT	Finland
Alcorta Galvan, Ricardo	CNRS, IEMN	France
Alsalami, Fatmeh	University of Manchester	UK
Alu, Andrea	City University of New York	USA
Assier, Raphael	University of Manchester	UK
Assouar, Badreddine	University of Lorraine	France
Bae, Myung Hwan	Ulsan National Institute of Science and Technology	Korea
Banerjee, Arnab	Indian Institute of Technology Delhi	India
Beardo, Albert	University of Colorado Boulder	USA
Belahurau, Yauheni	Technical University of Denmark	Denmark
Benchabane, Sarah	Université de Franche-Comté	France
Beoletto, Paolo Han	Politecnico di Torino	Italy
Bhatt, Abhigna	Indian Institute of Technology Delhi	India
Bilal, Osama	University of Connecticut	USA
Bonello, Bernard	CNRS Institut des Nanosciences de Paris	France
Bosia, Federico	Politecnico di Torino	Italy
Bradshaw, Georgia	University of Manchester	UK
Brun, Michele	University of Cagliari	Italy
Calius, Emilio	Computed Materiality, Auckland	New Zealand
Cazzaluni, Gabriele	Politecnico di Milano	Italy
Chaplain, Greg	University of Exeter	UK
Charlton, Charlotte	University of Manchester	UK
Chisari, Letizia	University of Sussex	UK
Clark, Monty Edward	University of Nottingham	UK
Clarke, Claudia Louise	DSTL	UK
Cominelli, Sebastiano	Politecnico di Milano	Italy
Cotterill, Philip	University of Manchester	UK
Cox, Trevor	University of Salford	UK
Craster, Richard	Imperial College London	UK
Croenne, Charles	CNRS, IEMN	France
Cutanda Henriquez, Vicente	Technical University of Denmark	Denmark
Das, Rishab	Indian Institute of Technology Delhi	India
Dass, Chandriker	Air Force Research Lab	USA
Davey, Robert	Thales UK	UK
Davies, Bryn	Imperial College London	UK
De Ponti, Jacopo	Politecnico di Milano	Italy
De Santis, Lorenzo	Politecnico di Milano	Italy
Deymier, Pierre	University of Arizona	USA
Diaz, Jon Canosa	JUNIA/IEMN	France
Djafari Rouhani, Bahram	CNRS, IEMN	France
Donner, Sean	University of Manchester	UK
Dorlot, Florent	Institute Langevin	France
Dorn, Charles	ETH Zurich	Switzerland
El-Kady, Ihab	Sandia National Labs	USA
Feng, Gao	Université de Bourgogne-Franche-Comté	France
Fleury, Romain	École Polytechnique Fédérale de Lausanne	Switzerland
Florez, Omar	ICN2	Spain
Fossat, Pascal	FEMTO-ST	France
Foxell, Emma	EPSRC	UK

Frazier, Michael	University of California	USA
Fytas, George	Max Planck Institute for Polymer Research	Germany
Gattin, Max	Univ Paris Est Creteil, Univ Gustave Eiffel	France
Geng, Zhuoran	University of Jyväskylä	Finland
Giannini, Daniele	KU Leuven	Belgium
Gliozzi, Antonio	Politecnico di Torino	Italy
Gonella, Stefano	University of Minnesota	USA
Gower, Artur	University of Sheffield	UK
Graczykowski, Bartłomiej	Adam Mickiewicz University	Poland
Guenneau, Sebastien	Imperial College London	UK
Gupta, Ankush	ASML	USA
Haberman, Michael	University of Texas at Austin	USA
Hales Swift, Stephen	Sandia National Laboratories	USA
Hall, Andrew James	University of Auckland	New Zealand
Harris, Adam	University of Colorado Boulder	USA
Hatanaka, Daiki	NTT Basic Research Laboratories	Japan
Hladky, Anne-Christine	CNRS, IEMN	France
Hussein, Mahmoud	University of Colorado Boulder	USA
Iglesias Martinez Julio Andres	FEMTO-ST	France
Jang, Sang Vin	Ulsan National Institute of Science and Technology	Korea
Jin, Yabin	Tongji University	China
Juhl, Abby	Air Force Research Lab	USA
Kadic, Muamer	Université de Franche-Comté	France
Kamruzzaman, Md	University of Illinois at Urbana-Champaign	USA
Kasprzak, Scott	NSWCCD	USA
Keogh, Melanie	University of Connecticut	USA
Kessissoglou, Nicole	UNSW Sydney	Australia
Kheybari, Majid	University of Connecticut	USA
Kianfar, Armin	University of Colorado Boulder	USA
Kim, Dohyeong	Ulsan National Institute of Science and Technology	Korea
Kim, Gihyun	Seoul National University	Korea
Kim, Namjeong	Ulsan National Institute of Science and Technology	Korea
Kim, Seung Han	Ulsan National Institute of Science and Technology	Korea
Kisil, Anastasia	University of Manchester	UK
Kogani, Ali	Concordia University, Montreal	Canada
Korkiamaki, Tatu Antti Santeri	University of Jyväskylä	Finland
Krasikova, Mariia	Technical University of Munich	Germany
Krushynska, Anastasiia	University of Groningen	The Netherlands
Kumar, Amit	EPSRC	UK
Kumar Dhiman, Anuj	Adam Mickiewicz University	Poland
Kunz, Valentin	University of Manchester	UK
Lam, Wei Kit	University of Sheffield	UK
Laude, Vincent	Université de Franche-Comté	France
Lazaro, Mario	Universitat Politècnica de València	Spain
Leamy, Michael	Georgia Institute of Technology	USA
Lee, Myung-Joon	Korea Advanced Institute of Science and Technology	Korea
Lee, Sung-Won	Ulsan National Institute of Science and Technology	Korea
Lemoult, Fabrice	Institut Langevin, ESPCI Paris, Université PSL	France
Li, Jensen	Hong Kong University of Science and Technology	Hong Kong
Li, Qingming	University of Manchester	UK
Liang, Yu-Jui	National Cheng Kung University	Taiwan
Lloyd, Hollie	University of Manchester	UK
Lombard, Bruno	CNRS, Laboratoire de Mécanique et d'Acoustique	France
Ma, Guancong	Hong Kong Baptist University	Hong Kong
Ma, Jihong Aafia	University of Vermont	USA
Ma, Pyung Sik	Korea Institute of Machinery and Materials	Korea

Maasilta, Ilari	University of Jyväskylä	Finland
Marburg, Steffen	Technical University of Munich	Germany
Matlack, Kathryn	University of Illinois Urbana-Champaign	USA
Matsuda, Osama	Hokkaido University	Japan
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McKinnel, Danel	University of Manchester	UK
Medvedeva, Elena	University of Manchester	UK
Meier, Johanna	FEMTO-ST	France
Memoli, Gianluca	University of Sussex	UK
Meng, Yang	Laboratoire d'Acoustique de l'Université du Mans	France
Millward, Frank	University of Manchester	UK
Morini, Lorenzo	Cardiff University	UK
Muhammad Muhammad	Trinity College Dublin; City University, Hong Kong	Ireland; Hong Kong
Nasser, Hussein	University of Missouri, Columbia	USA
Nethercote, Matthew	University of Manchester	UK
Nguyen, Ekaterina	University of Manchester	UK
Nigro, David	Thales UK	UK
Nistri, Fabio	Politecnico di Torino	Italy
Nomura, Masahiro	University of Tokyo	Japan
Nouh, Mostafa	University at Buffalo (SUNY)	USA
Oh, Joo Hwan	Ulsan National Institute of Science and Technology	Korea
Ordonez-Miranda, Jose	University of Tokyo	Japan
Otsuka, Paul	Hokkaido University	Japan
Pagneux, Vincent	Laboratoire d'Acoustique de l'Université du Mans	France
Palermo, Antonio	University of Bologna	Italy
Panda, Susmita	Indian Institute of Technology Delhi	India
Parnell, William J.	University of Manchester	UK
Patino, Nicholas	University of Colorado Boulder	USA
Patro, Somya Ranjan	Indian Institute of Technology Delhi	India
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Pendry, John	Imperial College London	UK
Pennec, Yan	Université de Lille	France
Pham, Kim	ENSTA Paris	France
Phani, Srikantha	University of British Columbia	Canada
Piva, Paulo Sergio	University of Sheffield	UK
Portela, Carlos	Massachusetts Institute of Technology	USA
Poulos, Markos	INSA-Lyon	France
Rawte, Prajit	University of Colorado Boulder	USA
Reda, Jana	Institut Langevin, ESPCI Paris, Université PSL	France
Reparaz, Sebastian	Materials Science Institute of Barcelona	Spain
Riva, Emanuele	Politecnico di Milano	Italy
Roca, David	Universitat Politècnica de Catalunya	Spain
Romero-Garcia, Vicente	Universitat Politècnica de València	Spain
Röntgen, Malte	Laboratoire d'Acoustique de l'Université du Mans	France
Rosa, Matheus	University of Colorado Boulder	USA
Rosafalco, Luca	Politecnico di Milano	Italy
Roshdy, Mohamed	University of Connecticut	USA
Rostami, Habib	University of Bath	UK
Ruan, Xiulin	Purdue University	USA
Russell, Eleanor	Thales UK	UK
Ruzzene, Massimo	University of Colorado Boulder	USA
Saatchi, Daniel	Korea Advanced Institute of Science and Technology	Korea
Sanchez-Dehesa, Jose	Universitat Politècnica de Valencia	Spain
Sethi, Muskaan	Indian Institute of Technology Delhi	India
Shemilt, James	University of Manchester	UK
Sheng, Ping	Hong Kong University of Science and Technology	Hong Kong

Shin, Ye Jeong	Ulsan National Institute of Science and Technology	Korea
Shmuel, Gal	Technion–Israel Institute of Technology	Israel
Skvortsov, Alex	Defence Science & Technology Group	Australia
Smith, Elizabeth	University of Illinois at Urbana Champaign	USA
Smith, John	DSTL	UK
Sorokin, Sergei	Aalborg University	Denmark
Sotomayor, Clivia	Catalan Institute of Nanoscience and Nanotechnology	Spain
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Srivastava, Ankit	Illinois Institute of Technology	USA
Starkey, Tim	University of Exeter	UK
Tessier Brothelande, Sarah	CNRS, IEMN	France
Theocharis, Georgios	Laboratoire d’Acoustique de l’Université du Mans	France
Thevamaran, Ramathasan	University of Wisconsin, Madison	USA
Termentzidis, Konstantinos	CNRS, INSA-Lyon	France
Titovich, Aleksey	NSWCCD	USA
Tol, Serife	University of Michigan	USA
Torrent, Daniel	Universitat Jaume I	Spain
Tortello, Mauro	Politecnico di Torino	Italy
Touboul, Marie	Imperial College London	UK
Umnova, Olga	University of Salford	UK
Vasconcelos, Ana	Delft University of Technology	The Netherlands
Vial, Benjamin	Imperial College London	UK
Wang, Pai	University of Utah	USA
Wang, Wan	FEMTO-ST	France
Wegener, Martin	Karlsruhe Institute of Technology	Germany
White, Tom	University of Manchester	UK
Willey, Carson	UES Inc	USA
Willis, John	University of Cambridge	UK
Wiltshaw, Richard	Imperial College London	UK
Wu, Ying	King Abdullah University of Science and Technology	Saudi Arabia
Xu, Changqing	Nanjing Normal University	China
Yamaguchi, Hiroshi	NTT Basic Research Labs	Japan
Yang, Jinkyu	Seoul National University	Korea
Yilmaz, Cetin	Bogazici University	Turkey
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The main title logo for 'Phononics 2023'. It features a blue, multi-lobed star-like shape made of overlapping lines on the left. To its right, the word 'Phononics' is written in a bold, red, sans-serif font, flanked by two horizontal red lines. Below 'Phononics', the year '2023' is written in a blue, sans-serif font.

6th INTERNATIONAL CONFERENCE ON PHONONIC CRYSTALS/METAMATERIALS/
METASURFACES, PHONON TRANSPORT, AND TOPOLOGICAL PHONONICS

June 12 - 16, 2023 – Manchester, England

