



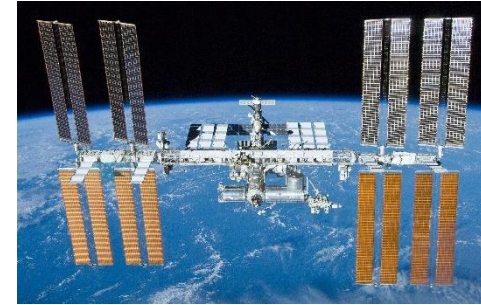
UK  
META  
MATERIALS  
NETWORK

## METAMATERIALS FOR SPACE: INTRODUCTION

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[www.metamaterials.network](http://www.metamaterials.network)

# Space & Aviation challenge



## Objectives

- Promote the application of metamaterials in Space and Aviation
- Work with stakeholders to identify potential application areas and to ensure that resulting metamaterial solutions overcome the barriers for use in the Space and Aviation sectors
- Provide a place for researchers to connect and facilitate the development of research ideas
- Facilitate connections between researchers in academia and relevant stakeholders (Industry, National Agencies, Funders, ...)
- Support relevant research applications

# Space

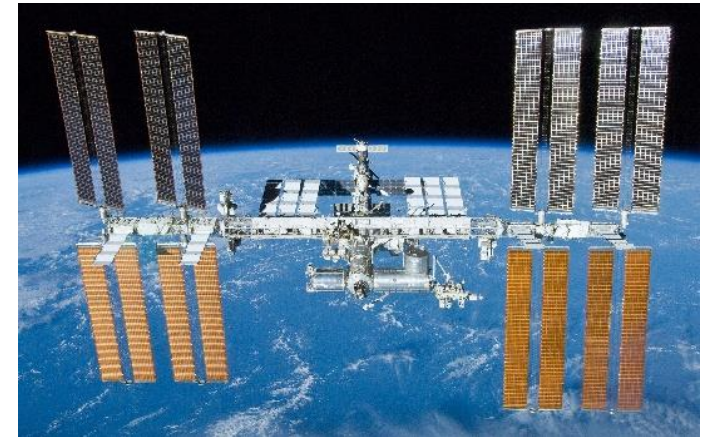
Two themes generally aligned to UK, European and other Space agency goals, such as supporting Space science and Earth observation, making access to Space sustainable, safe and easy and providing a resilient and fair-for-all communication infrastructure.

## Spacecraft Performance

- Communication
- Propulsion
- Power generation
- Impact protection
- Structural response
- Thermal control

## Observation and Sensing

- Observation of the near space environment from space and the ground
- Observation of the far space environment from space and the ground
- Planetary (inc. Earth) observation from Space
- Spacecraft operational sensing



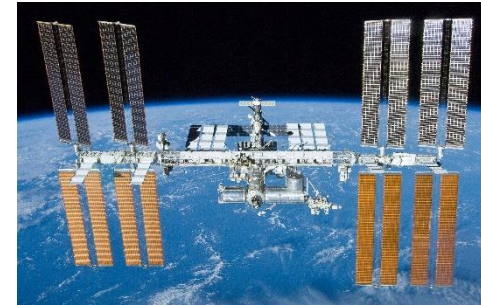
# Aviation

The Aviation sector has been one of the key early adopters of metamaterials technology, which has broad potential across a number of areas, such as low observable aircraft, safety systems and sustainable air travel.



Future events and interaction with key stakeholders  
will shape the key themes in this area

# Past and Future events

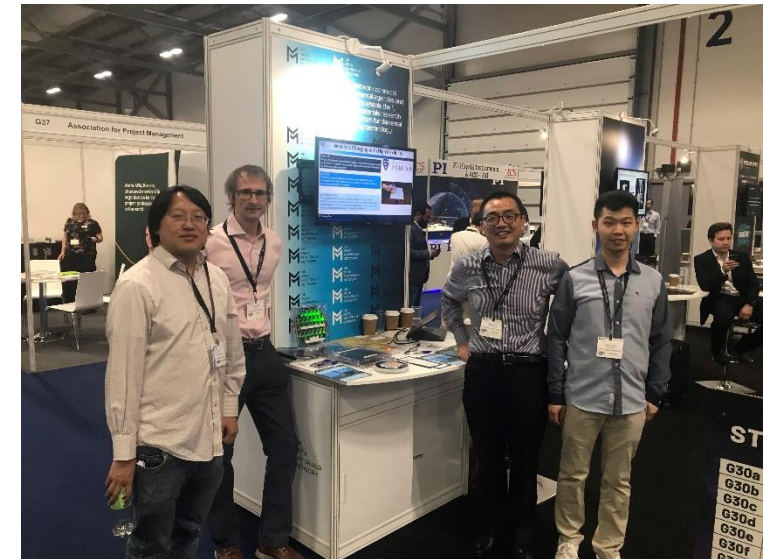


## Past

- UKMMN Conference 2022: Session to launch the Space theme
- Initial Expression of Interest for Space
- Online discussion to develop 2023 conference Space challenge session

## Future

- Event to launch the Aviation theme
- Sandpit events
- Project workshops
- Keynote seminars



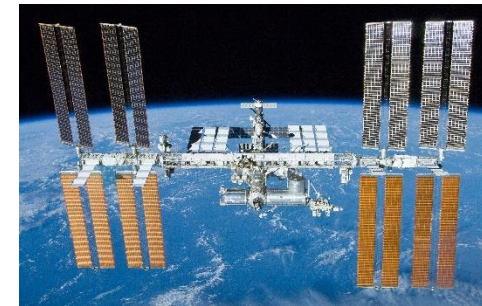
Representation: Innovate UK Technology Consultation for Space, Why Space? position paper (Satellite Catapult), UK Space-Comm Expo

# Today - Morning



time	Sessions	Speaker
09:00 - 09:10	<b>Metamaterials for Space: Introduction</b>	Dr Simon Pope (University of Sheffield)
09:10 - 10:30	<p><b>Current status and future direction of the Space sector</b></p> <p>1. "Metamaterials in Space: Exploring the UK Landscape, Challenges, Opportunities, and Perspectives"</p> <p>2. "Metamaterials and The Space Environment"</p>	<p><u>Chair:</u> Prof Alastair Hibbins (University of Exeter)</p> <p>1. Dr Mauro Augelli (UK Space Agency) 2. Dr Gemma Attrill (Dstl)</p>
10:30 - 11:00	BREAK	
11:00 - 11:45	<p><b>Opportunities for metamaterials in the space sector</b></p> <p>3. "UK civil space technology roadmap and the opportunities and challenges for materials"</p> <p>4. "Design and Manufacturing of Transparent Antennas for Satellite Communications"</p>	<p><u>Chair:</u> Prof Alastair Hibbins (University of Exeter)</p> <p>3. Dr Neelam Mughal (Innovate UK) 4. Dr Themis Kallos (META)</p>
11:45 - 12:30	Round table discussions: <b>MM for Space Application Opportunities</b>	<u>Chair:</u> Dr Simon Pope (University of Sheffield)
12:30 - 14:00	LUNCH BREAK (in the restaurant)	

# Today - Afternoon



	<b>Idea formulation and development of projects for metamaterials in Space</b>	
14:00 - 14:45	<p style="text-align: center;"><u>Tutorials</u></p> <ol style="list-style-type: none"> <li>1. "Structural Metamaterials for frequency control and vibration mitigation during launch"</li> <li>2. "Metamaterial antennas challenges and opportunities for space applications"</li> <li>3. "Metamaterials for spacecraft thermal control"</li> <li>4. "Metamaterials for optical communication and imaging, opportunities and challenges"</li> </ol>	<p>Chair: Dr Simon Pope (University of Sheffield)</p> <ol style="list-style-type: none"> <li>1. Prof Matthew Santer (Imperial College London)</li> <li>2. Prof Will Whittow (Loughborough University)</li> <li>3. Dr Kai Sun (University of Southampton)</li> <li>4. Dr Sebastian Schulz (University of St Andrews)</li> </ol>
14:45 - 15:45	Round table discussions: <b>Project development</b>	<u>Chair:</u> Dr Simon Pope (University of Sheffield)
15:45- 16:15	BREAK	
time	Sessions	Speaker
16:15 - 16:45	Project development summaries & ideas sharing	<u>Chair:</u> Dr Simon Pope (University of Sheffield)
16:45 - 17:00	Summary & close	Dr Simon Pope (University of Sheffield)
17:00 - 17:20	Group photo ( <i>gather in the conference room to be guided to the group photo spot</i> )	
18:30 - 21:00	Dinner & showcase session in & around the Evelyn Suites	