



University of
Southampton

Spring 2024

SPACE @ SOUTHAMPTON

News Round-Up



IN THIS ISSUE

Highlights 2 – 4

Professor Hendrik Ulbricht 2

Sparking inspiration 3

Achieving a circular economy in space 4

Meet the robotics community! 5



Forget smart phones, smart textiles are here 6



Could you become a black hole hunter? 8

AccelerComm goes from strength to strength 10

Things to look forward to 11

HIGHLIGHTS

PROFESSOR HENDRIK ULBRICHT

Professor Hendrik Ulbricht takes over as academic lead for Space@Southampton

After steering Space@Southampton since 2019, when the SPRINT Programme started, Professor Ian Williams will now step back to devote more time to research. Hendrik Ulbricht, who recently won the 2023 ESA Payload Masters competition, now takes the helm. His research group performs quantum experimental research and pioneers levitated opto and magneto-mechanics experiments, where light and magnetic fields are used to trap and control nano and micro particles in vacuum.



SPARKING INSPIRATION

Can holding Space Funding sandpits, generate bid proposals? Space@ Southampton leveraged its EPSRC IAA funding to hold two space funding sandpits and a series of professionally facilitated proposal writing workshops.

Held in January, the brainstorming events led into a series of proposal writing workshops in February–March. Seven projects emerged in time to book workshops. Funding under consideration was ESA Business Applications, the UKSA International Bilateral Fund and the National Space Innovation Programme (NSIP) Kickstarter fund. Technologies covered include textiles for space; fuel and metal production on the lunar surface; Quantum levitated mechanics (LOMS) for applications in space; Multi-Robot Space Exploration with Human Supervision; and Life Sciences in space.

Space company, AstroAgency provided their excellent professional facilitation to help the teams fill in their application forms.

Some of these proposals will be ready to submit by the time the calls are released.

More in the pipeline

There are several other excellent project ideas in the planning stage and receiving support from Space@Southampton. We hope some will be ready to submit to calls that come out later in the year.



If you have a project idea that you think might be suitable for space funding, get in touch by emailing fmc@soton.ac.uk and we can advise and, if you want, help you to find industry partners.



ACHIEVING A CIRCULAR ECONOMY IN SPACE

On 7 March, at this year's Space-Comm Expo, Professor Ian Williams kicked off a panel event entitled: 'Moving towards a sustainable future in space and setting the scene for a circular economy', which was Chaired by Andrew Staniland, CEO of Thales Alenia Space.

Ian's context-focused talk outlined the need to optimise use of resources and develop technologies to accelerate on-orbit services. He pointed to how financial support needs to run in tandem with a political will to recycle and outlined the economic case for why recycling in space should become a reality. This set the scene for a terrific panel debate, which, among other things, discussed the need to become

space-debris neutral; a safer space environment; developing technologies to accelerate on-orbit services; the growth potential in the on-orbit services market; capabilities like space-based solar power and on-orbit computing and data centres; and the philosophical necessity of accepting that we must start by pledging not to degrade the environment in space as we have done on Earth.

Panel I-r: Andrew Staniland, TAS (Panel Chair); Miguel Belló Mora, Orbex; Andrew Faiola, Astroscale; Ian Williams, University of Southampton; Martin Soltau, Space Solar and Simon Reid, D-ORBIT

MEET THE ROBOTICS COMMUNITY!

Our exciting ‘Robotics and Space’, event on 20 February was attended by 8 companies giving many opportunities for staff and students to mingle, network and make new connections during lunch and breaks.

Among many other things the impressive presentations covered robotic swarms, training astronauts to use robots, Mars Rovers; robots for in-space manufacturing, robots for in-situ resource utilisation, the need to minimise human error, ESA missions relying on robotics and space based solar power. The view from industry indicated that their main challenge is attracting enough robotics engineers to come and work in space.

Sincere thanks to all our great speakers at the event: Jeremy Hadall (Satellite Applications Catapult), Emma Barden (Thales Alenia Space), Elie Allouis (Airbus), Professor Yang Gao (Kings College London), Susan Charlesworth (Charlesworth Human Factors), Dr Mohammad Soorati (University of Southampton), Hazel Mitchell (PhD student, University of Southampton) and Professor Mark Young (University of Southampton).

We are planning some follow-up activities sparked by the event, email fmc@soton.ac.uk to find out more.

Feedback from ‘Robotics and Space’

“Thank you for the invitation to join the panel. It was a good event to get people in the Robotics community talking, and also maybe introducing some new points of view.”

Steven Kay


Panel speaker, GMV*

“It was a great event, and it was really interesting to hear from all the different speakers about space robotics in their respective fields. I’m glad I was able to get involved.”

Hazel Mitchell

PhD student, University of Southampton

*GMV leverages space assets to provide services to sectors including space, intelligent transport systems, cybersecurity, connected autonomous vehicles, and AI for healthcare. GMV hold the ESA contract for the maintenance and evolution of the Galileo Ground Control Segment (GCS), the European global satellite navigation system; and are a world-leader in space robotics.

 **Get advance warning of space events at Southampton – join the email list by emailing**

fmc@soton.ac.uk

FORGET SMART PHONES, SMART TEXTILES ARE HERE

Before too long, space travellers could be wearing clothes that would alert doctors if their wearers had a health problem, thanks to Dr Katrina Morgan's pioneering research.

The assistant professor in Electronics and Computer Science is developing flexible energy harvesters, powering sensors connected through the Internet of things, and scavenging the heat of our own bodies, harnessing temperature gradients, whether that is from the user themselves using their body heat, or from something mounted on the outside of a spacecraft.

"Thermoelectric generators produce power from the heat of our bodies," she explains. "Modern sensors can now operate with these very low levels of power, especially if you add other energy sources such as solar. Being flexible, they can also be used on curved surfaces, such as spacecraft and satellites, that are exposed to tremendous differences in temperature."


Katrina has already been involved in a project funded by EU Horizon to mount LED lights powered by thermoelectric generators on workwear such as hi-viz jackets.

"My dream is that within five years we will have developed a flexible user-friendly energy patch to sew into clothing. It would be especially useful for medical applications such as monitoring vital signs 24/7 as it wouldn't need charging", says Katrina. "Although I love being in the lab carrying out research at the nanoscale, this is so worthwhile as it can really help people."

Katrina is newly back in Southampton after working as a Development and Integration Engineer with AIM Photonics in Albany, the Research Foundation of the State University of New York (SUNY), where she was developing new material processes in a commercial, semiconductor fabrication facility, producing novel wafers for clients. "Experiencing the USA as a resident was amazing and it was both an unforgettable experience and incredibly valuable for my career."

Katrina first got involved in this research after finishing her PhD at Southampton. Professor of Optoelectronics Dan Hewak had grant funding for wearable technology and suggested she might find it interesting. Almost ten years later, she's still fascinated by the potential for space to enable ground-breaking innovations here on earth.





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Dr Katrina Morgan

COULD YOU BECOME A BLACK HOLE HUNTER?

Associate Professor Matt Middleton from University of Southampton's School of Physics and Astronomy, who studies black holes, has now been appointed Chair of the Space Academic Network's ("SPAN") Space Science and Exploration Working Group and hopes the group will play an increasingly important role in highlighting achievements in the sector.

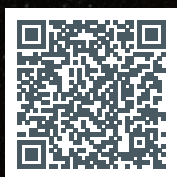
Matt is one of several younger scientists and engineers who are joining the Space Academic Network (SPAN) to influence the future by advising the UK Space Agency and the UK Government's Department of Science, Innovation and Technology. He is urging his peers to get involved with external organisations like these to contribute their thoughts and opinions and add diversity. He believes many people don't realise the importance of the UK's contribution to global space research: "We rank third behind the US and China in factors like citations."

Matt's work combines space research with enthusing his students about stellar evolution. And not just students; Matt has recruited ordinary members of the public as volunteers too. In January 2024, Matt launched a citizen

science project, with PhD student Adam McMaster, to help detect elusive black holes in our galaxy.



"We know our galaxy is teeming with black holes but we've only found a handful. People could help us change that," said Matt. "We are explaining to our volunteers what signs to look out for."

"Black holes are invisible. Their gravitational pull is so strong that not even light can escape, making them incredibly hard to see, even with specialist equipment. But that gravitational pull is also how we can detect them, because it's so strong that it can bend and focus light, acting like a lens that magnifies light from stars. Our volunteers will be assessing views of the galaxy and looking for those tell-tale signs."



➤ To become a volunteer and help find new black holes, follow this link


www.southampton.ac.uk/news/2024/01/black-hole-hunters.page



“Black holes are invisible. Their gravitational pull is so strong that not even light can escape, making them incredibly hard to see, even with specialist equipment.”

Associate Professor Matt Middleton



 **To find out more about Matt's work, follow this link**

https://assets.publishing.service.gov.uk/media/64afdb40c033c1001080623b/the_case_for_space.pdf

ACCELERCOMM GOES FROM STRENGTH TO STRENGTH

University of Southampton spin-out AccelerComm is forging ahead with its global vision to launch innovative wireless telecom services and applications. The key is using fast and reliable 5G networks to radically improve how orbiting satellites communicate with users on the ground.

Following years of research by Professor Rob Maunder and his colleagues in Electronics and Computer Science, AccelerComm is now working with Lockheed Martin to develop the concept further.

“In the past, the company that built and operated the satellite had to be the same one that sold you the user terminals,” explains Rob. “Now, with standardised 5G signals, we have a kind of universal language for communications between space and Earth, which means people can use different types of user terminals and even hand-held devices. The turning point came when Apple announced that its iPhone 14 would have built-in satellite connectivity.”

The collaboration with Lockheed Martin was crucial to AccelerComm meaning Rob’s team could move on from just designing components to designing entire systems. The company invested in knowledge and skills and now employs 80 people, most of them in Southampton. Further research is underway into advanced 5G and 6G technologies with AI-powered processors on the horizon.

Rob divides his time between four days a week as Chief Technical Officer at AccelerComm and a day at the University, teaching and supervising



PhD students and remaining personally involved in the enterprise agenda.

“The University of Southampton is a friendly environment for people who want to become entrepreneurial. We received a lot of support with things like patents when we were getting started and I find it very rewarding to pass on that help to the next generation as well as keeping in touch with what’s new and exciting in engineering.

“Southampton is punching above its weight when it comes to enterprise. We have impressive facilities, and initiatives such as FutureWorlds encourage and motivate students, providing practical help for them to develop their enterprise ideas.”

THINGS TO LOOK FORWARD TO

April

Orbit South Central

Monthly networking event.

Wednesday 24th April 2024
11:00–12:30

University of Portsmouth
Technopole Building, Kingston Crescent
North End, PO2 8FA

May

Orbit South Central

Monthly networking event.

Wednesday 22nd May 2024
11:00–12:30

Surrey Space Centre
Stag Hill University Campus
Guildford GU2 7XH

June

Space Sector networking opportunity: Orbit South Central event

Part of Space South Central's vibrant series of monthly networking events attended by industry and academia.

Everyone welcome. Includes lunch.

Space South Central

The largest regional space cluster in the UK.

Wednesday 26th June 2024
11:00–14:00

University of Southampton
Building 44/1057 (Lecture Theatre B, Shackleton Building), Highfield Campus

July

Sixth UK Mobile, Wearable and Ubiquitous Systems Research Symposium

University of Southampton Sixth UK Mobile, Wearable and Ubiquitous Systems Research Symposium

8th–9th July 2024

mobiuk.org



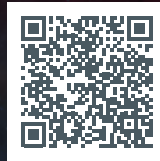
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Find out more:

www.southampton.ac.uk

Join the email list!

Email Frances Clarke fmc@soton.ac.uk to join the Space@Southampton email list and receive advance notice of events and funding opportunities



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