

[News story: UK Space Agency invites teams to submit more details on ISS experiments](#)

The UK Space Agency plans to select a number of these to fund for flight to the ISS.

Following a call for ideas that was published in December 2107, 25 ideas were received. These were reviewed by the UK Space Agency and European Space Agency for feasibility, scientific merit, fit to UK priorities and outreach opportunities. From the 25 submitted 14 have been invited to submit full details of their proposed experiments. These will be fully reviewed before selection.

Libby Jackson, Human Spaceflight and Microgravity Programme Manager, said:

The large number and high quality of ideas received in this initial round is a testament to the strength of the microgravity community here in the UK. I am very excited to see the full proposals and give the scientific and academic communities this opportunity to get their experiments to the International Space Station.

Earlier this week, on Monday, 2 April, the SpaceX Dragon spacecraft launched on a Falcon 9 rocket carrying cargo to the ISS that showcases the ingenuity of the UK space sector. The cargo included a UK-built satellite, RemovedEBRIS, that will test different approaches to removing space junk from the Earth's orbit, and ASIM, an international science package to study powerful lightning from space.

The projects selected for full proposals span a broad range of scientific disciplines, including human life science, biology, physical sciences and Earth observation.

The 14 teams selected are:

University of Birmingham, Professor Kai Bongs and Dr Yeshpal Singh, Optical Flywheel on the International Space Station

This project seeks to demonstrate the concept of an optical flywheel in space. Such technology would enable a wide range of key future commercial applications using optical links. A number of fundamental science research areas, such as the fields of relativistic geodesy, detection of gravitational waves, and cold atom-based interferometry would benefit from the ability to use such technology.

University of Brighton, Professor Marco Marengo, Waste Heat Recovery through Magnetic Pulsating Heat Pipe

The proposed project aims to investigate the electrical power generation and thermal performances of a novel pulsating heat pipe system with one or more solenoids and a magnetic fluid as working fluid. Confirming the feasibility of this technology would allow it to be applied to a wide range of applications, both on ground and the space environment.

University of Bristol, Professor Kate Robson-Brown, Changes to the spine in microgravity: a zebrafish model

This experiment proposes to employ the unique environment of microgravity on the ISS to study the response of the zebrafish spine to microgravity, to improve understanding of how the spine degenerates in humans.

University of Edinburgh, Professor Charles Cockell, Motile microbes in space (MOTILE)

This experiment seeks to understand how microgravity affects microbes that can swim (motile bacteria) compared to those that cannot. The answer to this question may provide an explanation for a lot of data concerning the behaviour of microbes in space and the answer would give us new insights into how life adapts to space.

University of Edinburgh, Professor Grunde Jomaas, Fire Risk Management for Spacecraft through Fundamental Flammability Studies

This project aims to study, understand and improve the fundamental scientific knowledge of fire behaviour in microgravity for the purpose of delivering a well quantified fire safety strategy and the bespoke technologies necessary to implement it in future exploration missions.

University of Exeter, Dr Tim Etheridge, Exploring novel therapeutics to health decline in space

A high-throughput, automated in vivo approach: This experiment aims to study whether a panel of novel pharmacological compounds has the potential to prevent spaceflight-induced health decline in vivo, and do so using a new automated, high-throughput culturing device. This work would demonstrate the efficacy of existing drugs on preventing/attenuating key indices of health decline during spaceflight and validate the technology of the culturing device.

Glasgow Caledonia University, Dr Suzanne Hagan, Investigation of Tear Fluid Biomarkers as an Indicator of Human Health

This proposal seeks to find out if there are measurable changes to tear fluid inflammatory proteins in astronauts exhibiting Spaceflight Associated Neuro-

ocular Syndrome (SANS) which may serve as potential biomarkers to aid in earth based diagnostics of conditions affecting the central nervous system.

University of Kent, Dr. Penelope Wozniakiewicz, Dust Characterisation with the International Space Station

This project proposes the installation of a passive collector experiment on-board the International Space Station to investigate particle populations in low Earth orbit. Monitoring particle populations is vital to understanding the hazards they pose to spacecraft of all kinds in orbit and therefore how to mitigate against them, and also aids understanding of the inventory, formation and evolution of Solar System bodies from which the natural dust population originates.

University of Liverpool, Professor Malcolm Jackson, Microgravity as a model for accelerated skeletal muscle ageing

Previous work by this group has shown that age-related deficits in muscle are linked with an inability of muscle from older people and animals to respond appropriately to exercise. They wish to investigate if a similar failure occurs in muscle exposed to microgravity, to aid understanding of the underlying mechanisms that affect muscle in the ageing population.

University of Nottingham, Professor Nathaniel Szewczyk, C. elegans Experiment-2 (ICE-2)

This experiment proposes to build on previous experiments to investigate what molecules control the biological response to spaceflight by studying the response of the worm *C. elegans* to microgravity. The team anticipate that identifying a molecular mechanism by which spaceflight alters biology further work could be undertaken how this impacts astronaut health, means to counter it and relevance to Earth biology.

University of Oxford and Kings College London, Professor Peter Robbins and Dr Thomas Smith, Study of Advanced Gravitational Physiology of the Lung

This project seeks to understand the factors that cause the baseline variation in inflation in the lungs that is normally present in healthy people by applying the technique of in-airway molecular flow sensing. This information will help develop innovative means of detecting lung disease on Earth.

RAL Space Daniel Gerber, TARDiS

THz Atmospheric/Astrophysics Radiation Detection in Space: This project proposes a remote sensing payload for the ISS which would detect Terahertz signals from space and the Earth's atmosphere. Monitoring the abundance of atomic oxygen in the upper atmosphere would improve understanding of upper atmospheric cooling, which is believed to be directly related to climate change. Looking into space would pinpoint the location of newly born 'warm'

stars which would improve understanding of the physical processes in star formation.

**University of Strathclyde, Dr Marcello Lappa,
Thermovibrationally-driven Particle self-Assembly and ordering
mechanisms in low gravity (PAMELA)**

This experiment would seek to explore a new control method of complex fluids based on the application of “vibrations”. Once this technique has been validated through experiments, it could be applied to allow the production of “new” inorganic or organic materials in space with properties that cannot be obtained on the Earth.

**University of Surrey, Professor Simon Archer, Implementation on
the ISS of blood transcriptome-based biomarkers**

The physical effects of disruption to sleep patterns are understood but the underlying molecular mechanisms are less understood. This experiment would seek to detect disruption to the temporal organisation of the human blood transcriptome in crew in space, to seek to provide a model for ageing on Earth and further validate the team’s sleep restriction and simulated microgravity bed rest findings.