Ariel space mission to study alien worlds passes crucial test milestone

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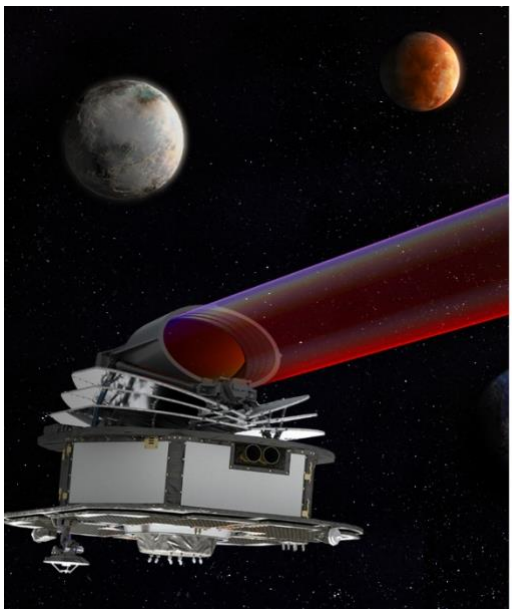
The Ariel payload has cleared a major test milestone, paving the way for the mission that will uncover the secrets of over 1000 alien worlds.

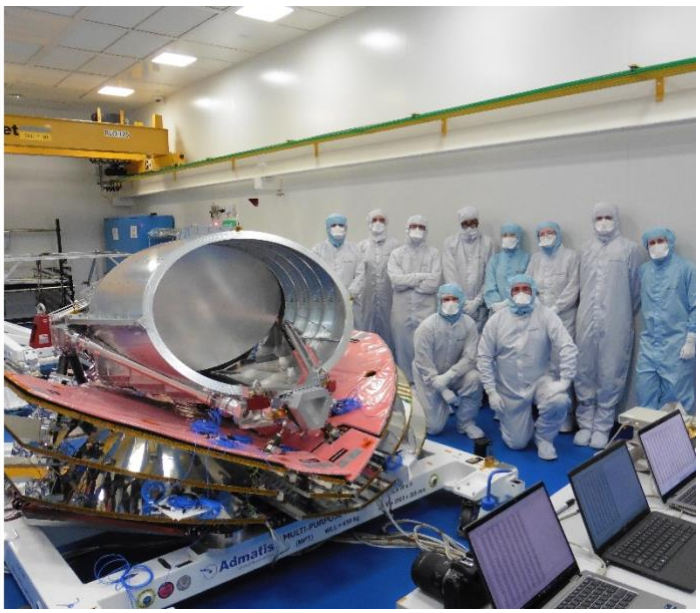
Analysing distant worlds

The discovery of the first planets outside our Solar System (exoplanets) came in the 1990s and thousands more have been identified since then. Most exoplanets discovered so far do not resemble the planets found in our Solar System. There is a much greater variety of planetary types, but scientists don't yet know why.

As a result, the field has evolved from finding new exoplanets, to studying and understanding them in greater detail. A large-scale survey is essential to our understanding of these distant worlds.

The European Space Agency's (ESA) Ariel mission will do exactly that. Ariel will observe around 1000 exoplanets, from rocky worlds to large gas giants, to investigate the nature of their atmospheres, both individually and across populations. It will also monitor the activity of their host stars.





Left: Artist's impression of Ariel which will orbit the Sun 1.5 million kilometres from Earth. Credit: ESA. Right: The Ariel team alongside the fully assembled structural model. Credit: STFC RAL Space

Ariel payload progress

Ariel's payload is the part of the spacecraft that enables its science mission. It includes the telescope assembly, scientific instruments, and supporting hardware, and is being developed by a consortium of more than 50 institutes across 16 ESA countries and contributions from NASA, the Japanese Space Agency (JAXA) and the Canadian Space Agency.

The first step in assembling any space-bound hardware is usually to create a structural model – a full-size physical representation used to validate the design and integrity of all components before construction of the flight model begins.

Ariel's payload structural model has now passed its preliminary tests, marking an important milestone for the mission's overall progress.

The Ariel payload was assembled and tested at the Science and Technology Facilities Council's (STFC) RAL Space, the UK's national space laboratory. RAL Space leads the payload consortium, coordinating contributions from across Europe, the US, Canada and Japan, and overseeing the assembly and testing of the payload itself.

Testing for take-off

After a period of 5 months integration at RAL Space, the structural model underwent a series of demanding tests at the UK's National Satellite Test Facility (NSTF).

The first challenge was acoustic testing. The intense acoustic environment of a rocket launch can shake spacecraft to their core, and in the NSTF this environment is recreated using an array of powerful speakers and amplifiers.

Next came mass properties testing, a crucial step to understand the payload's total mass, centre of gravity, and moments of inertia with extremely high precision. These measurements tell engineers vital information about how the spacecraft will behave during launch and throughout its journey to orbit. For Ariel, that journey will take it 1.5 million kilometres from Earth to its operational home. Knowing the spacecraft's "resistance" to rotation is essential for fine-tuning how it will be controlled once in space.

Finally, the payload faced the most violent phase: vibration testing. Satellites and spacecraft must endure extreme vibrations during launch, and large shaker tables at the NSTF replicated these forces in three directions.

Passing these tests is a significant milestone for any mission. For the Ariel team, who had spent months painstakingly assembling the payload, seeing the structural model withstand these trials was a proud moment.

What's next for Ariel?

Assembly of the engineering model will begin later this year. This version will be fully representative of the flight model, and will include electronics and subsystems that weren't required on the structural model.

The engineering model will not be required to undergo the same mechanical tests as the previous model, but instead will have to endure thermal vacuum testing, where it will be exposed to the vacuum and temperature conditions of space.

UK leadership for the mission

With funding from the UK Space Agency, UK institutions are playing a leading role in Ariel's science and engineering. RAL Space leads the payload consortium, with contributions from across the UK, including STFC's Technology Department, which is developing the mission's cryogenic active cooler system.

Meanwhile, King's College London is leading the mission science, ensuring Ariel's observations address fundamental questions about these mysterious worlds.

Dr Rachel Drummond, Ariel UK National Project Manager at STFC RAL Space said:

"The entire Ariel Mission Consortium is thrilled to see the culmination of years of dedication and collaboration with this milestone. Seeing components from across Europe and around the world finally come together into a physical model of this ambitious mission has been remarkable, and it's a huge achievement to see it pass these mechanical tests.

We're now looking forward to our next challenge: diving into terabytes of data to understand exactly how every element responded during mechanical testing. This is a crucial step as we move onto the engineering model and subsequently closer to launch."

Professor Giovanna Tinetti, Ariel Consortium Principal Investigator and Vice-Dean Research in the NMES faculty at King's College London said:

"We are all delighted and grateful to the international engineering team led by RAL Space for the enormous amount of work and dedication they have put to guarantee a successful completion of this test campaign.

This result marks an important accomplishment in the construction of Ariel and a significant step forward in our journey to understand the planets in our galaxy."

Jean-Christophe Salvignol, Ariel Project Manager at the European Space Agency, said:

"Ariel is a flagship ESA mission, and the successful completion of the Payload Structural Model test campaign at RAL Space marks a solid milestone on the road to the flight model. The payload being delivered by the Ariel Mission Consortium (uniting institutes and industry from across Europe and working closely with partners in the US, Canada and Japan) is a key element of the mission, and this achievement reflects the strength of our international collaboration and the dedication of teams across all contributing organisations."

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Notes to editors

Download image and video footage related to Ariel and its recent test campaign here: Ariel May 2026. (Please contact Anna Purdue for access information)

About RAL Space

STFC RAL Space is the UK's national space laboratory, working in partnership with government, industry, and academia to advance our understanding of space and our environment – for the benefit of all. Based at the Rutherford Appleton Laboratory and Chilbolton Observatory, our 350+ experts work across the lifecycle of space missions. We contribute to groundbreaking projects across Earth observation, space weather, planetary science, and astronomy, working with UK and international partners including ESA, NASA, and the UK Space Agency. As part of the Science and Technology Facilities

Council (STFC) and the wider UK Research and Innovation (UKRI), RAL Space plays a central role in shaping the UK's space capabilities.

https://www.ralspace.stfc.ac.uk

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