



**RESEARCH** | ENABLING SCIENTIFIC DISCOVERY



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## USING SPACE AS A PLATFORM

Conducting experiments in the extreme conditions of space enables researchers to study biological and physical phenomenon in ways not possible on Earth – expanding scientific knowledge for the benefit of all. This research has contributed to many advancements on Earth: from medical treatments to greener combustion engines, new technologies to consumer products – and more. And it's also led to commercial patents and spin-off companies that impact our everyday lives.

## ADVANCING U.S. SCIENCE LEADERSHIP

The mission of NASA's Biological and Physical Sciences Division (BPS) is to lead the world in fundamental spacebased research, pioneer transformational discoveries, enable sustained human space exploration, and improve life on Earth and in space. BPS administers NASA's:

- Space Biology Program, which uses the space environment to advance our knowledge of how gravity, radiation, and other space-flight stressors affect the design and function of living organisms, and to understand how biological systems accommodate to them. Research disciplines include animal biology, plant biology, and microbiology.
- Physical Sciences Program, which uses the space environment as a tool to understand how physical systems respond to space-flight environments, particularly weightlessness and the partial gravity of planetary bodies. Research disciplines include quantum science, combustion, soft matter, materials sciences, fluid physics, and biophysics.
- Commercially Enabled Rapid Space Science project (CERISS), which aims to develop transformative research capabilities with commercial space industry to dramatically increase the pace of research.

## THE NEXT DECADE OF FUNDAMENTAL RESEARCH

BPS's research priorities are guided by Decadal Surveys issued by the National Academies of Sciences, Engineering, and Medicine. BPS has

received the 2023-2032 Decadal Survey for Biological and Physical Sciences Research in Space and is developing plans to respond to the priorities recommended by the Academies.

## COLLABORATIONS

BPS collaborates with many partners to achieve transformative science. These partners include peer NASA divisions and directorates, other government agencies, international space organizations, commercial companies, and academia.

## SCIENTIFIC ACCOMPLISHMENTS

NASA-funded research has contributed to many scientific advancements. Here are just a few that made news in 2022-2023:

- Scientists grew plants in lunar regolith collected during the Apollo mission – a scientific first – which can inform future Moon and Mars missions, as well as contribute to agricultural advancements on Earth.
- Researchers developed a cooling technique created for use in space that also makes charging electric cars on Earth quicker and easier.
- Data from a fluid physics experiment informed improvements to software utilized by SpaceX, which can help reduce the risks and costs associated with storing cryogenic propellants.
- Soft matter colloids data was fundamental to the development of new consumer products, resulting in five patents.
- CAL produced the first dual-species Bose-Einstein Condensates in space and the first dual-species atom interferometers in space, enabling precision tests of Einstein's equivalence principle.

