




ALMA MATER STUDIORUM  
UNIVERSITÀ DI BOLOGNA

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## SPACE EXPLORATION

*Exploring space to advance  
our knowledge and innovate  
technology.*



The University of Bologna is involved in several space exploration projects.

- Space mission remote sensing/imaging, astrodynamics, orbit determination, deep space navigation, radio-tracking
- Applications of thermal and cold plasma in spaceflights
- Portable multiplex biosensors and devices for the in-flight monitoring of biomarkers in astronaut physiological changes and strength recovery. Effects of space conditions on cells
- Ageing, immunology, immunosenescence, microRNA and epigenetic changes in space, muscle performance in zero gravity, calcification, space bioreactor
- Hibernation, thermoregulation, sleep regulation, radiation resistance, physiology
- High-resolution molecular spectroscopy, quantum chemical calculations, prebiotic and complex organic molecules
- Microbial life in extreme environments. Lab-on-chip devices for detecting biomarkers of extant or extinct extraterrestrial life

## HIGHLIGHTS

**The University of Bologna participates in major projects and experiments such as:**

- NASA/ESA/ASI Cassini-Huygens, ESA SMART-1, ESA BepiColombo, ESA ExoMars, NASA JUNO, ESA JUICE missions, NASA Europa Clipper, ESA Hera, ASI LICIAcube, ASI ArgoMoon (radio science experiments)
- ESA Topical Team Hibernation
- Portable bio analyzer (IN SITU project) employed by the ESA astronaut P. Nespoli in his VITA mission onboard the ISS
- SPARE (Space Radiation Shielding) project with ASI and INFN
- Europlanet 2024 RI
- NASA mm/submm heterodyne sensor for outer solar system exploration
- BIOSIGN-MICROFOSSILS experiment onboard the ISS
- Exploration of the Danakil Depression as planetary analogue
- SARCOLAB-3 project with DLR, ESA, NASA

**Facilities and infrastructures:** Laboratory for physiology of the autonomic nervous system; Laboratory for Astrobiology and Geomicrobiology; Laboratory for clinical & functional evaluation; Tesla Plasma laboratory for non-thermal plasma; Langmuir BioPlasma Bacteria laboratory; Open Physics Hub laboratory for sensors and high-speed computing; Laboratory for high-resolution molecular spectroscopy; Laboratory of Analytical and Bioanalytical Chemistry; Laboratory for motion analysis in zero gravity conditions. The University is also part of STAR the Interuniversity Center for Astrochemistry Radio Science and [Planetary Exploration Lab](#).

**Extensive collaborations** are present with primary European companies and as well as with several universities, agencies and research centers such as: ASI, INAF, INFN, INGV, ESA, NASA, DLR, TIFPA, EANA, ESSC, ALMA Regional Center, MPE, CNRS.