

MICROGRAVITY SCIENCES AND PROCESSES (A2)
Microgravity Sciences onboard the International Space Station and Beyond (6)

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ISS RESEARCH PRIORITIES OF THE GERMAN PHYSICAL SCIENCES PROGRAM

Abstract

The German Space Program integrates the German participation in ESA programs, activities within the National Program as well as the RD activities at the research institutes of the research establishment DLR. The German Physical Sciences Program is part of the program Research under Space Conditions and deals exclusively with gravity-dependent effects on physical and chemical processes. The main program goal is to gain scientific knowledge and to disclose new application potentials by fundamental and application-oriented research, especially utilizing the ISS.

Currently, about 30 scientific institutions are involved in the Physical Sciences Program and 40 scientific projects funded by the Space Agency. For implementation on the ISS, 28 experiments with German coordinators/principal investigators are peer selected.

The research disciplines of the German Physical Sciences Program cover materials sciences, fluid physics, combustion science, and fundamental physics. The current research priorities are the following:

- materials design from the melt: solidification dynamics, thermophysical properties of metallic melts
- structure and dynamics of fluid flow: open capillary channels, spherical gaps, liquid-liquid and liquid-solid interfaces
- basic combustion mechanisms: fuel droplets and sprays
- fundamental interactions: quantum, plasma, and cosmic dust systems.

The paper will present the German research topics and on-going facility developments for microgravity experiments on the ISS and further long term flight opportunities like FOTON retrievable satellites. In this context, cooperations with NASA, ROSCOSMOS, and ESA will be explained. Bilateral cooperations play an important role in DLR's program implementation on the ISS. Scientific goals, experimental approach, and status of the running projects will be characterized. An outlook to future ISS experiments will be given.