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Author: Dr. Thorben Könemann
ZARM Fab GmbH, Germany

Mr. Ulrich Kaczmarczik
ZARM University of Bremen, Germany

Mr. Christian Eigenbrod
University of Bremen, Germany

Mr. Peter von Kampen
ZARM Fab GmbH, Germany

Dr. Claus Lämmerzahl
ZARM University of Bremen, Germany

FUTURE PROSPECTS IN RESEARCH UNDER SPACE CONDITIONS AT THE DROP TOWER
BREMEN

Abstract

The Center of Applied Space Technology and Microgravity (ZARM) founded by Prof. Dr.-Ing. Hans J. Rath in 1985 is part of the Department of Production Engineering at the University of Bremen, Germany. ZARM established as a research center and currently headed by Prof. Dr. Claus Lämmerzahl is mainly concentrated on fundamental investigations of gravitational and space-related phenomena under conditions of weightlessness as well as questions and developments related to technologies for space. At ZARM more than 70 scientists, engineers and administrative staff as well as many students from different departments are employed. Today, ZARM is still one of the largest and most important university institutes for space sciences and technologies in Europe as well as worldwide accepted in the space community.

With a height of 146 m the Drop Tower Bremen is the predominant facility of ZARM and also the only drop tower of its class in Europe. Its planning and construction period began in February 1987 and were completed within only three years. Since then, ZARM's ground-based laboratory offers the opportunity for daily short-term experiments under conditions of high-quality weightlessness at a level of 10^{-6} g (microgravity). The provided quality is one of the purest for experiments under weightlessness worldwide achieved. The scientists may choose between a single drop experiment with 4.74 s in simple free fall and a catapult experiment with 9.3 s of weightlessness. Either in the drop or in the worldwide unique catapult operation routine the repetition rates of microgravity experiments at ZARM are always the same, generally up to 3 times per day.

The ZARM Drop Tower Operation and Service Company (ZARM FAB mbH) managing, operating and maintaining the Drop Tower Bremen was established in 1990 along with the start of operation of the facility. Since then, over 6500 launches of more than 150 different experiment types from various scientific fields like Fundamental Physics, Combustion, Fluid Dynamics, Planetary Formation / Astrophysics, Biology and Materials Sciences have been successfully accomplished by ZARM FAB mbH so far. Furthermore, ZARM FAB mbH gives a comprehensive technical support and offers experiment hardware as for instance high-speed cameras to realize drop tower experiments in close cooperation with the corresponding scientists.

In this paper future prospects in research under space conditions at the Drop Tower Bremen will be presented including an update on our planned novel facility, the GraviTower Bremen, and an outlook of upcoming experiments and projects.