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UPDATE ON THE GRAVITOWER BREMEN PRO

Abstract

The Center of Applied Space Technology and Microgravity (ZARM) founded in 1985 is part of the Department of Production Engineering at the University of Bremen, Germany. ZARM 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, about 100 scientists, engineers, administrative staff, and many students from different disciplines are employed. Today, ZARM is one of the largest and well-known research center for space sciences and technologies in Europe. With a height of 146 m, the Bremen Drop Tower is the predominant facility of ZARM and also the only drop tower of this kind in Europe. 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. Scientists may choose up to three times a day between a single drop experiment with 4.74 s in simple free fall and an experiment in ZARM's worldwide unique catapult system with 9.3 s in microgravity. Since the start of operation of the drop tower facility in 1990, over 8750 drops or catapult launches of more than 250 different experiment types from various research fields like fundamental physics, combustion, fluid dynamics, planetary formation / astrophysics, biology, chemistry, and material sciences have been accomplished so far. In addition, more and more technology tests have been performed under microgravity conditions at the Bremen Drop Tower, in order to prepare single space instruments or appropriate space missions in advance.

In this paper, we give a status update on the GraviTower Bremen Pro (GTB Pro), a novel ground-based microgravity facility, which is in its final test operation stage at ZARM and approaches its overall inauguration. The GTB Pro represents an actively driven drop tower system that is capable to perform over 100 short-term microgravity experiments per day. Its technology is based on a commercial hydraulic winch system. The GTB Pro offers a further alternative to perform dedicated microgravity research as well as prepare experiments for other suborbital platforms or respectively for space missions.