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# PROGRESS ON CONCEPTS FOR NEXT-GENERATION DROP TOWER SYSTEMS

**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 is mainly concentrated on fundamental investigations of gravitational and space-related phenomenas under conditions of weightlessness as well as questions and developments related to technologies for space. At ZARM about 100 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 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 its class 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 (microgravity), which is one of the best achievable for ground-based flight opportunities. 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 weightlessness. Since the start of operation of the facility in 1990, over 7500 drops or catapult launches of more than 160 different experiment types from various scientific fields like fundamental physics, combustion, fluid dynamics, planetary formation / astrophysics, biology and materials sciences have been accomplished so far. In addition, more and more technology tests have been conducted under microgravity conditions at the Bremen Drop Tower in order to effectively prepare appropriate space missions in advance.

In this paper we report on the progress on concepts for next-generation drop tower systems based on the GraviTower idea utilizing a guided electro-magnetic linear drive. Alternative concepts motivated by the scientific demand for higher experiment repetition rates are discussed.