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THE GRAVITOWER BREMEN PRO - EXPERIENCES WITH A NEXT-GENERATION DROP
TOWER SYSTEM**Abstract**

The GraviTower Bremen Pro (GTB Pro) represents ZARM's new next-generation drop tower system, which makes use of a rail-guided rope drive being able to perform over 12 short-term microgravity experiments per hour. Its technology is based on a commercial hydraulic winch system with more than 4000 hp of engine power that moves a rail-guided drag shield in a 16 m high tower, upwards and downwards. With its novel and sophisticated Release-Caging-Mechanism (RCM), the actively driven GTB Pro located in the integration hall of the Bremen Drop Tower is capable to control heavy payloads in a very smooth and precise manner. The RCM developed and patented by ZARM also enables a fast and reliable decoupling as well as re-coupling of the experiment capsule inside the drag shield. Due to the fact that the standard capsule of the Bremen Drop Tower is utilized, high synergy effects are given between both, the Bremen Drop Tower and GTB Pro. It means a simple switching between all operation modes (drop, catapult, or GTB Pro) with the same experiment capsule. Furthermore, GTB Pro's user-friendly software control interface and artificial intelligence (AI) capabilities interacting with the experimental setup now bring microgravity experimenting on a laboratory level. In conclusion, the GTB Pro excellently complements the Bremen Drop Tower and offers to explore a wide range of parameters, to test preliminary setups or experiment components, to qualify new technologies for space missions, or to perform dedicated microgravity research with a very high repetition rate. Additionally, partial-g experiments will be feasible in the GTB Pro as well.