

DROPTES - ZARM AND THE BREMEN DROP TOWER

THE UNITED NATIONS ACCESS TO SPACE FOR ALL INITIATIVE

Dr. Merle Cornelius
ZARM Drop Tower Operation and Service Company



Who am I?



- ▶ Dr. Merle Cornelius
- ▶ Dep. Head of Science and Operation
ZARM Drop Tower Operation and Service Company (ZARM FAB mbH)
- ▶ Academic career
 - ▶ Bachelor and Master of Science in physics at the University of Bremen
 - ▶ First student job at ZARM (2013)
 - ▶ PhD in physics (University of Bremen, 2022)
 - ▶ Quantum optics – atom interferometry with Bose-Einstein condensates
 - ▶ Over 250 drop tower experiments
- ▶ Since March 2023 at ZARM FAB mbH

ZARM - Center of Applied Space Technology and Microgravity

c/o Universität Bremen
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www.zarm.uni-bremen.de



ZARM - University of Bremen

Research Institute - Faculty 04 Production Engineering

Prof. Dr. Marc Avila
(Executive Director)

- FLUID DYNAMICS
- SPACE SCIENCE
- SPACE TECHNOLOGIES
- HUMANS ON MARS

Research / Teaching

ZARM FAB mbH

ZARM Drop Tower Operation and Service Company

Prof. Dr. Marc Avila
Peter von Kampen
(Executive Board)

Dr.-Ing. Thorben Könnemann
(Head of Science & Operation)

Dr. Merle Cornelius
(Dep. Head of Science & Operation)

Technical Support

ZARM Technik AG

Supplier of Attitude Control Equipment for Satellites

Holger W. Oelze
(Chief Executive Officer)

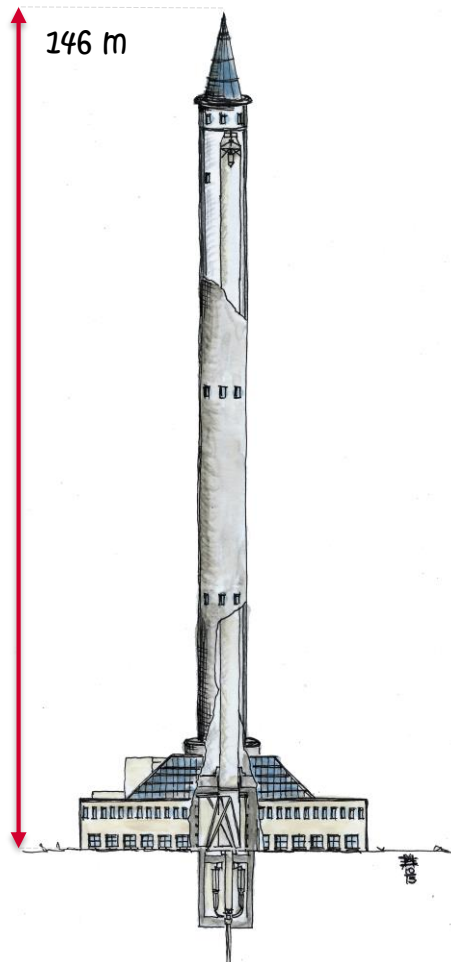
Peter von Kampen
(Chief Financial Officer)

Marco R. Fuchs
(Chairman of Supervisory Board)

Space Hardware



Bremen Drop Tower



Drop

- ▶ 110m Free Fall distance
- ▶ Microgravity time 4.7 s

Worldwide unique catapult

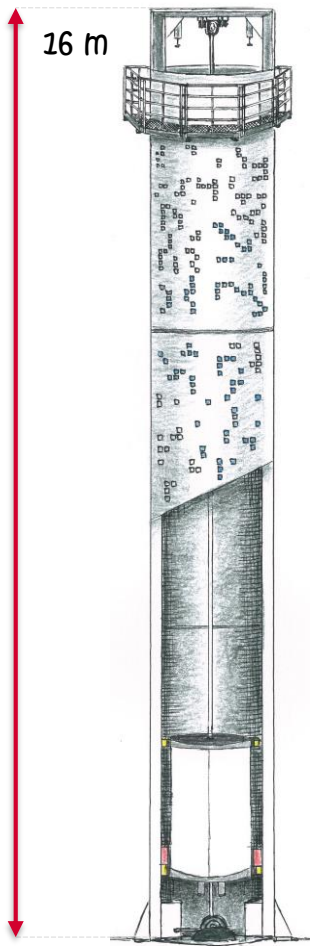
- ▶ Launch on vertical parabola
- ▶ Microgravity time 9.3 s

Vacuum in inner tube to reduce air drag

- ▶ High microgravity quality ($\Delta g < 10^{-6} \text{ g}$)
- ▶ Limited to 3 experimental runs per day (due to vacuum)

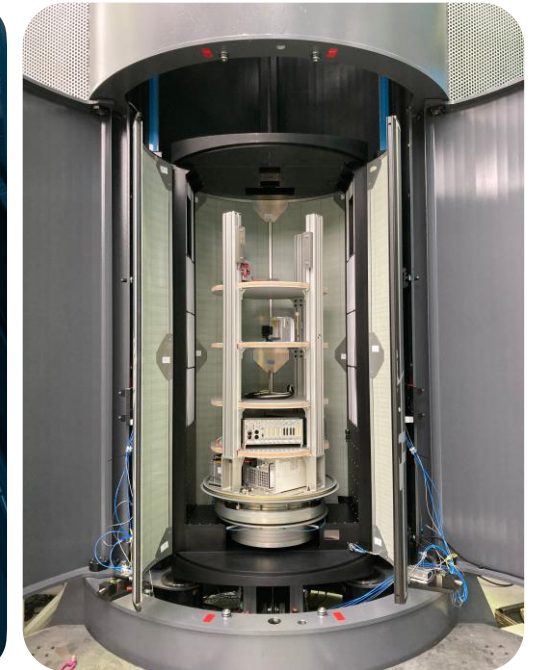
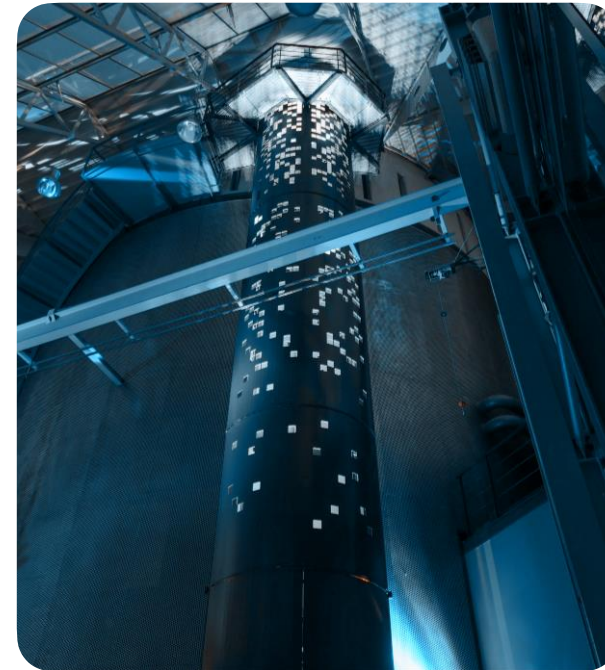


GraviTower Bremen Pro

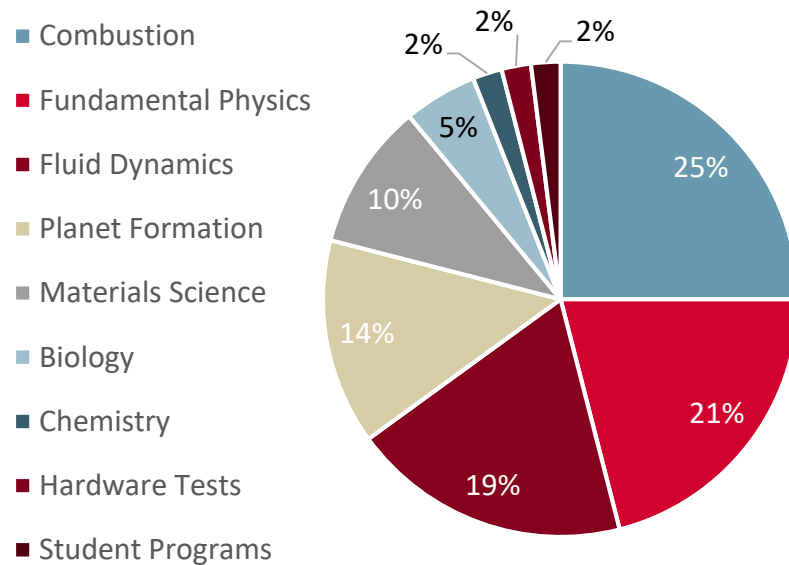


Guided movement on vertical parabola

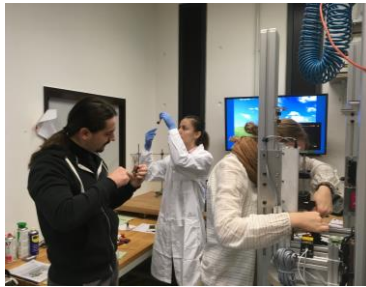
- ▶ Decoupling experiment from slider
 - ▶ Slider acts as air shield
 - ▶ No vacuum needed
- ▶ Microgravity time up to 2.5 s
- ▶ High microgravity quality ($\Delta g < 10^{-4}g$)
- ▶ High repetition rate of up to 960 runs per day
- ▶ Partial-gravity option



Drop Tower Experiments



- ▶ Scientific experiments in various research field
- ▶ Hardware tests for space missions → Stepping stone into space
- ▶ Student programs
 - ▶ DropTES
 - ▶ REXUS/BEXUS
 - ▶ ESA academy: PETRI



- ▶ ZARM contribution to DropTES since 2014
- ▶ Experiments in the fields of science and technology developing

9. Round 2023 – Open for application until 26 November 2023

8. Round 2022/23 – **Universidad de Antioquia** (Columbia)

7. Round 2020 – **Universidad Católica Boliviana San Pablo** (Bolivia)

6. Round 2019 – **Politecnico de Milano** (Italy)

5. Round 2018 – **University of Bucharest**

and Politehnica University of Bucharest (Romania)

4. Round 2017 – **Warsaw University of Technology** (Poland)

3. Round 2016 – **Instituto Tecnológico de Costa Rica**

and Universidad de Costa Rica (Costa Rica)

2. Round 2015 – **Universidad Católica Boliviana San Pablo** (Bolivia)

1. Round 2014 – **German Jordanian University** (Jordan)

Thank you!



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Payload User's Guide



Acknowledgements



Gefördert durch:



Bundesministerium
für Wirtschaft
und Energie

aufgrund eines Beschlusses
des Deutschen Bundestages



UNITED NATIONS
Office for Outer Space Affairs

