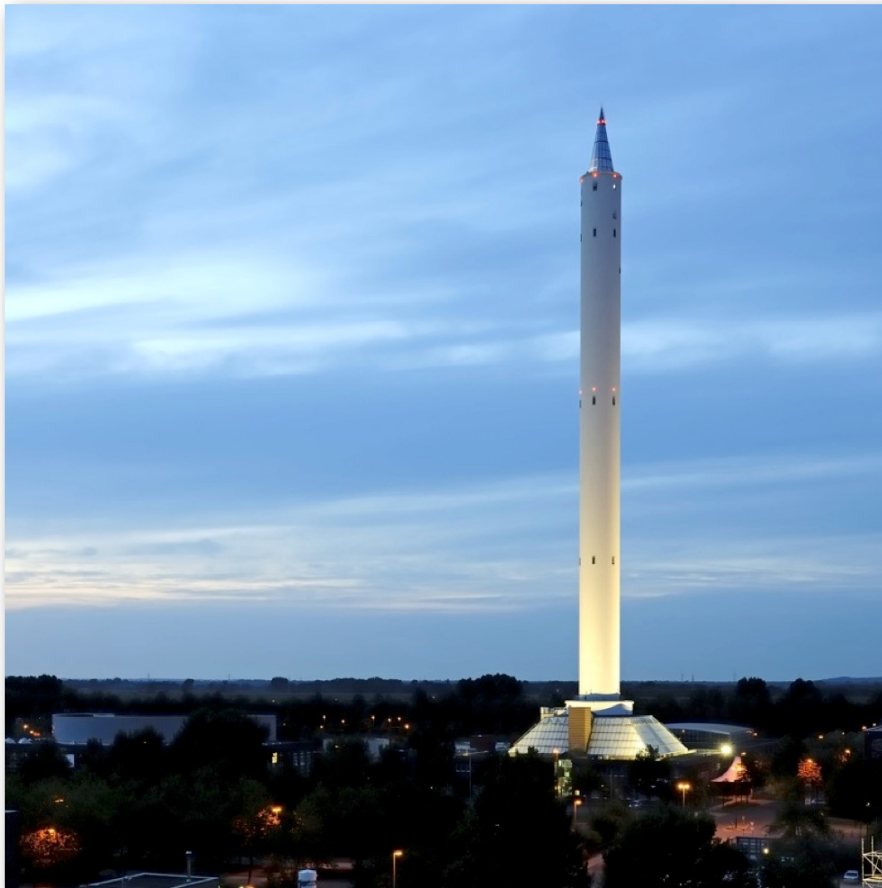


## **DropTES - a new Fellowship Program of UNOOSA at the Bremen Drop Tower**



**Claus Lämmerzahl**

**ZARM FAB mbH**

**ZARM Drop Tower Operation  
and Service Company**

**c/o University of Bremen  
Am Fallturm  
28359 Bremen  
Germany**

**[www.zarm.uni-bremen.de](http://www.zarm.uni-bremen.de)**



## Bremen - Where We Come From ...





## Bremen - Where We Come From ...

- **UNESCO World Heritage**
  - **The Bremen Town Hall**
  - **The Bremen Roland**



## Bremen - Where We Come From ...

- **Largest Aerospace Site in Germany**
  - **Aerospace Companies:**
    - Airbus Defence and Space / „Astrium“ (Columbus Module, ATV, Ariane, ...)
    - OHB System (Galileo, MTG, ...)
    - Airbus
  - **Space Research Institutes:**
    - DLR - Institute of Space Systems (German Aerospace Center)
    - ZARM - University of Bremen (Cooperations, Education)
  - **Space Conferences:**
    - IAC 2003 -> IAC 2017 - Application
    - COSPAR 2010

Bremen Town Musicians





## Outline

**1. Introduction: ZARM**

**2. Introduction: Bremen Drop Tower**

**3. DropTES - Drop Tower Experiment Series**



# ZARM's Organization Structure

founded  
in 1985

## ZARM - Center of Applied Space Technology and Microgravity

c/o University of Bremen  
Am Fallturm, 28359 Bremen, Germany  
www.zarm.uni-bremen.de



### ZARM - University of Bremen



#### Research Institute - Faculty 04 Production Engineering

Prof. Dr. Claus Lämmerzahl  
(Executive Director)

Prof. Dr. Claus Lämmerzahl  
(Director Space Science)

Prof. Dr. Claus Braxmaier  
(Director Space Technology)

- to be announced -  
(Director Fluid Dynamics)

### ZARM FAB mbH



#### ZARM Drop Tower Operation and Service Company

Prof. Dr. Claus Lämmerzahl  
Peter von Kampen  
(Executive Board)

Christian Eigenbrod  
Dr.-Ing. Thorben Könemann  
Ulrich Kaczmarczik  
(Scientific / Technical Management)

### 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 the Supervisory Board)

› Research / Teaching

› Drop Tower

› Space Hardware



Center of Applied Space Technology and Microgravity



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### ZARM - University of Bremen



**Research Institute - Faculty 04  
Production Engineering**

▸ approx. 70  
Scientists / Staff

▸ approx. 30  
Students

from Engineering, Physics,  
Mathematics, Computational Science

▸ Research / Teaching

### ZARM FAB mbH



**ZARM Drop Tower Operation  
and Service Company**

▸ 20 Engineers / Staff

▸ Drop Tower

### ZARM Technik AG



**Supplier of Attitude Control  
Equipment for Satellites**

▸ 10 Engineers / Staff

▸ Space Hardware



Center of Applied Space Technology and Microgravity

# ZARM's Organization Structure

founded  
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for  
Young Scientists

### ZARM - University of Bremen



Research Institute - Faculty 04  
Production Engineering

▸ approx. 70  
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from Engineering, Physics,  
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ZARM Drop Tower Operation  
and Service Company

▸ 20 Engineers / Staff

### ZARM Technik AG



Supplier of Attitude Control  
Equipment for Satellites

▸ 10 Engineers / Staff

Friends of ZARM

▸ Research / Teaching

▸ Drop Tower

▸ Space Hardware

▸ Support



Center of Applied Space Technology and Microgravity



## ZARM's Research Institute

### ZARM - University of Bremen Research Institute - Faculty 04 Production Engineering

c/o University of Bremen  
Am Fallturm, 28359 Bremen, Germany  
[www.zarm.uni-bremen.de](http://www.zarm.uni-bremen.de)



#### Space Science

Director

Prof. Dr. Claus Lämmerzahl

Experimental Gravitation &  
Quantum Optics

Quantum Theory & Gravity

Gravitational Theory

Micro Satellite Systems &  
Modelling Methods

Thermofluid Dynamics

#### Space Technology

Director

Prof. Dr. Claus Braxmaier

Metrology & AVIT

Space Propulsion &  
Energy Systems

Aerospace Combustion  
Engineering

Space Components /  
Environmental Testing

Phase 0/A Studies

#### Fluid Dynamics

Acting Director

Prof. Dr.-Ing. Michael Dreyer

Multiphase Flow

Experimental Fluid Mechanics

### Research Groups & Sub-Groups



Center of Applied Space Technology and Microgravity

# ZARM's Research and Test Facilities

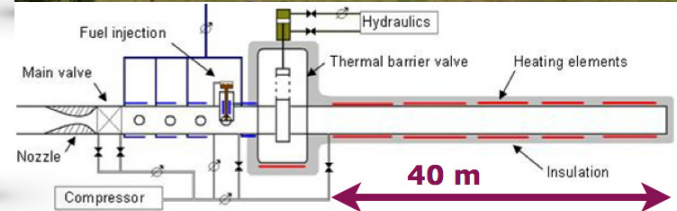
**1. Drop Tower**



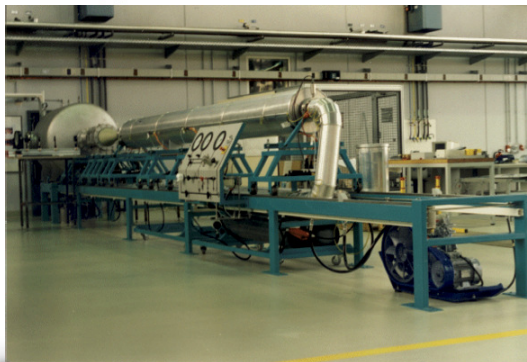
**2. 30g-Centrifuge**



**3. Hot Wind Tunnel**



**4. Hypersonic Wind Tunnel**



**5. Circulating Water Tunnel**



**6. Vibration Test Laboratory**

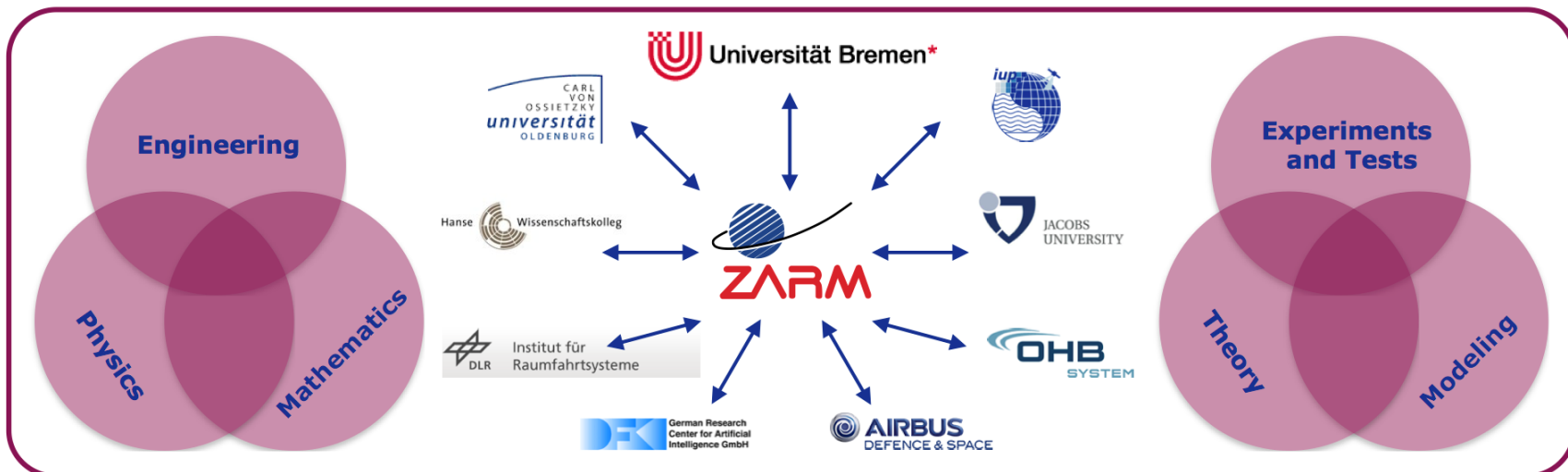




## ZARM's Expertise and Networks

at one  
location

- **Unique Expertise in Space Research and Space Technology**
  - through multi-, interdisciplinary and synergetic studies



- **Support of Students / Young Scientists in Space Experiments**
  - **Drop Your Thesis! - Student Program by ESA**
  - **REXUS / BEXUS - Student Program by DLR / SNSB**



## Outline

**1. Introduction: ZARM**

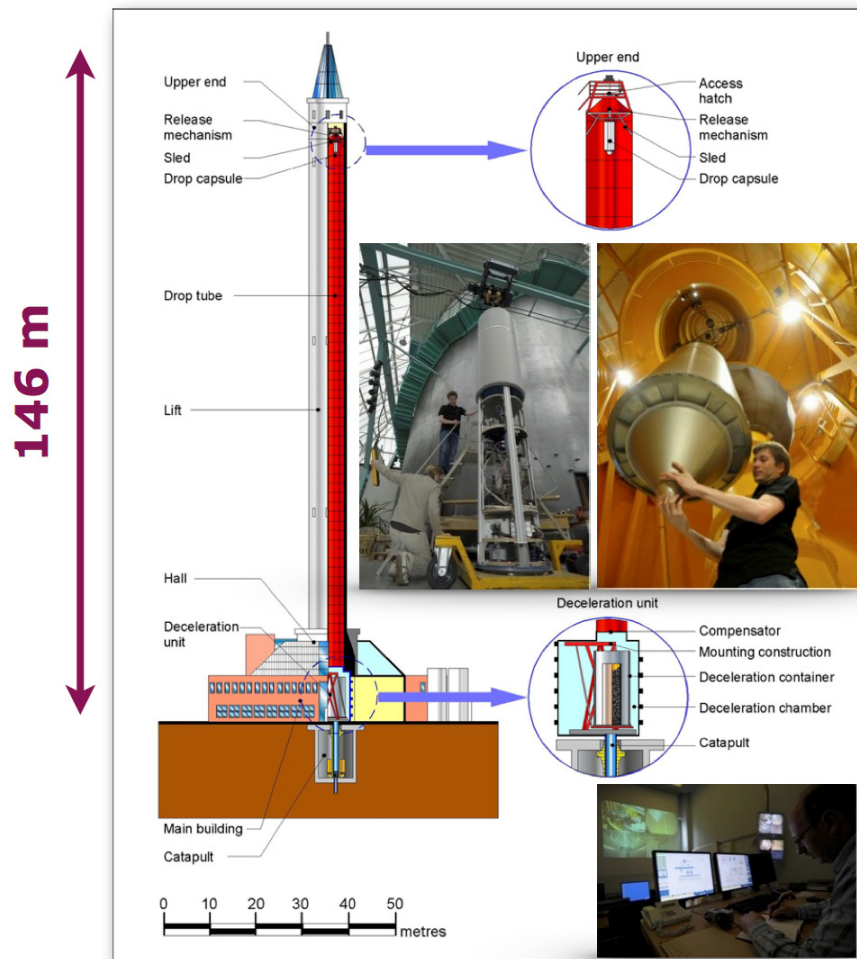
**2. Introduction: Bremen Drop Tower**

**3. DropTES - Drop Tower Experiment Series**





## Introduction: The Bremen Drop Tower

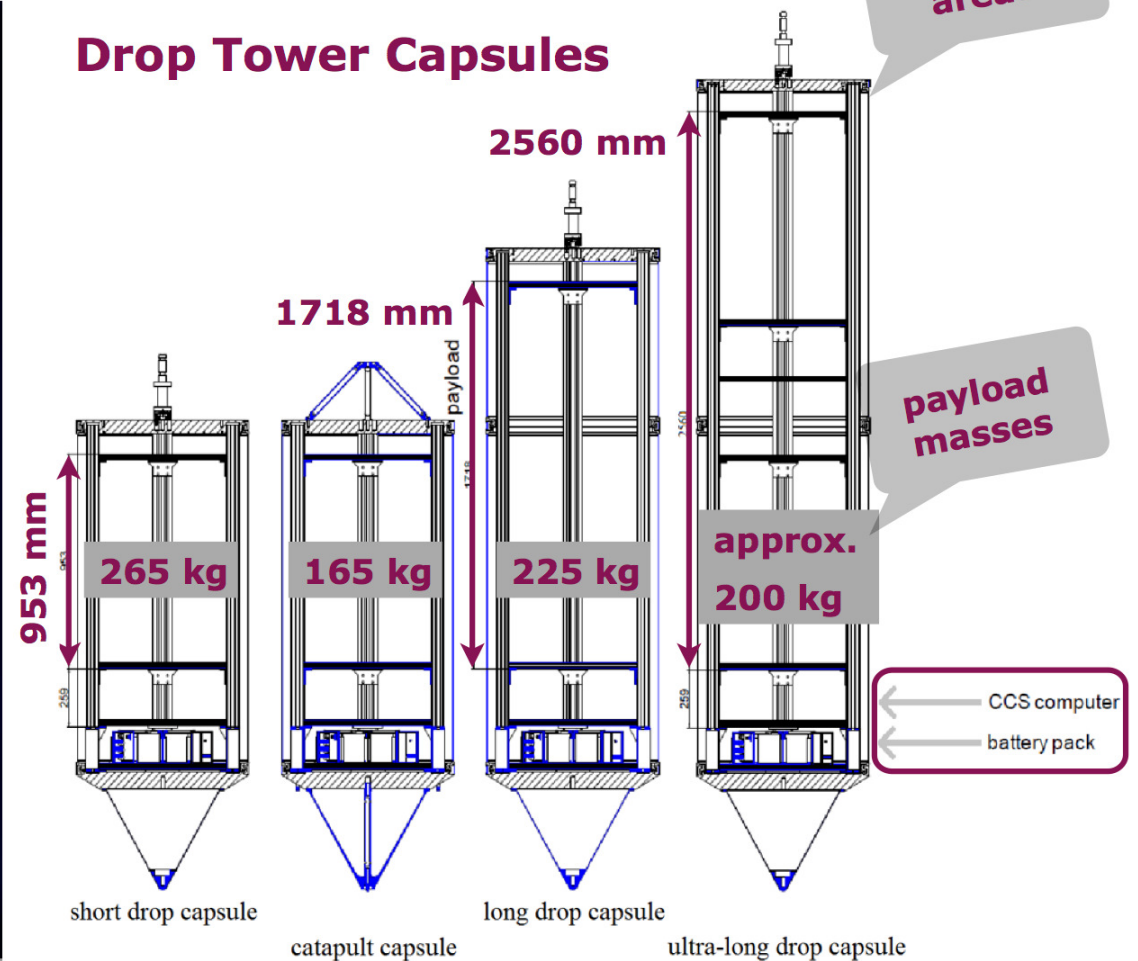


- **microgravity options:**
  - **drop mode**
    - **4.74 s weightlessness**
    - **high-quality  $10^{-6}$  g ( $\mu$ g)**
    - **deceleration up to 50 g**
  - **catapult mode**
    - **9.3 s weightlessness**
    - **high-quality  $10^{-6}$  g ( $\mu$ g)**
    - **acceleration up to 30 g**
    - **deceleration up to 50 g**
- **up to 3 times per day**
- **ground-based space laboratory**
  - **easy access**
  - **quick access**
  - **economic access**

## Introduction: The Bremen Drop Tower



### Drop Tower Capsules





## Introduction: The Bremen Drop Tower

Center of Applied Space Technology and Microgravity

Bremen - Germany

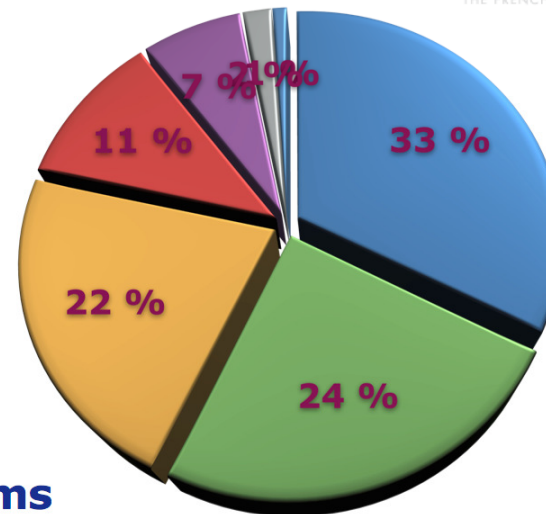


*we create space for experiments*

## Introduction: The Bremen Drop Tower

- since the start of operation of the Drop Tower Bremen:
  - › over **6750 drops / catapult launches** have been conducted
  - › more than **160 different experiment types** have been integrated
  - › within **international collaborations from 42 countries**

- research fields of conducted drop tower experiments



- › supported by DLR and/or ESA
- › through simple user application forms
- › **scientific utilization is free of charge !** - after a positive proposal evaluation -
- › including technical services by **ZARM FAB mbH** (consulting, integration, ...)



## Outline

**1. Introduction: ZARM**

**2. Introduction: Bremen Drop Tower**

**3. DropTES - Drop Tower Experiment Series**



## DropTES - Drop Tower Experiment Series

- **Human Space Technology Initiative (HSTI) Science Activity**
  - › provides one team of **Bachelor, Master and/or PhD students** (who must be endorsed by an academic supervisor)
  - › to conduct one drop tower experiment series **in November 2014**
  - › in total **four drops or catapult launches** at the Bremen Drop Tower
- **The DropTES Fellowship Programme**
  - › is open to research teams **from non-space-faring countries**
  - › and includes **financial support**:
    - the travel costs are covered by **UNOOSA**
    - the four drops or catapult launches are covered by **DLR**
    - for the stay in Bremen **ZARM** provides its on-site apartment
- **The selected team of Bachelor, Master and/or PhD Students**
  - › will develop their drop tower experiment in strong cooperation with the **ZARM Drop Tower Operation and Service Company**



UNITED NATIONS  
Office for Outer Space Affairs



## DropTES - Drop Tower Experiment Series

DropTES  
Schedule

- **Timeline of the Application and Selection Process:**

- **deadline for application submission:** **February 28, 2014**
- **selection of applicants:** **April 1, 2014**

- **Timeline of the Experiment Process:**

- **preparation of drop tower experiment:** **April - October, 2014**
- **transfer of the experiment to Bremen:** **October - November, 2014**
- **Drop Tower Experiment Series in Bremen:** **November 24-28, 2014**  
(experiment integration at the drop tower: 1-2 weeks in advance)
- **experiment report submission:** **March 31, 2015**

- **Latest Information on the HSTI DropTES Fellowship Programme:**

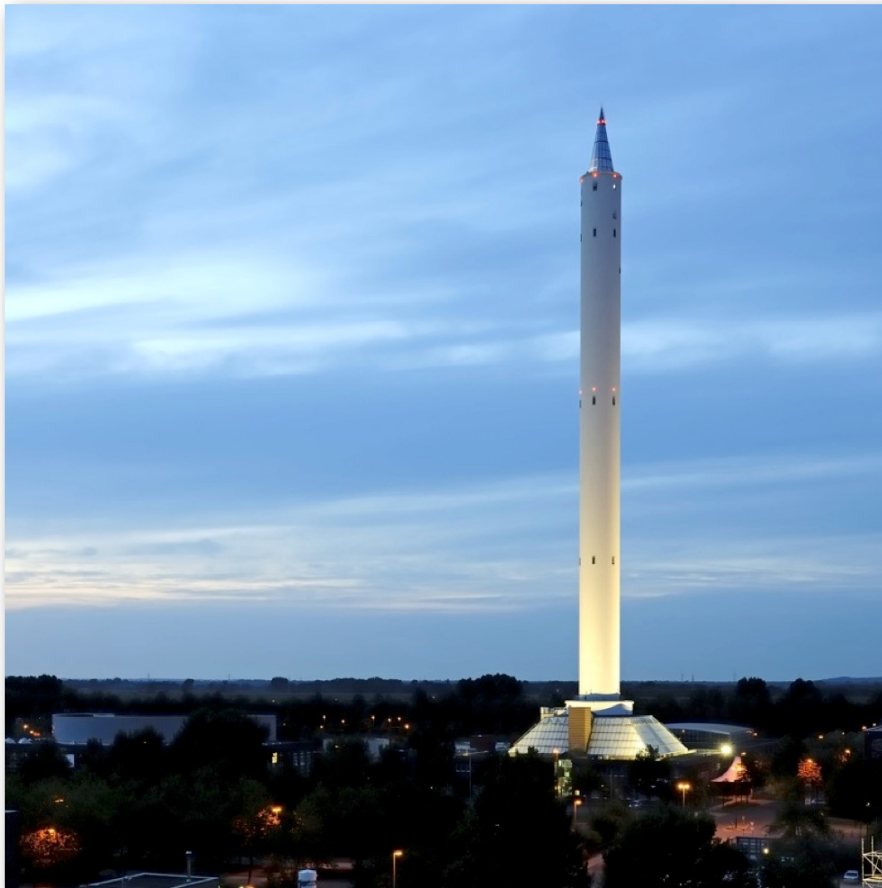
- [\*\*http://www.unoosa.org/oosa/en/SAP/hsti/index.html\*\*](http://www.unoosa.org/oosa/en/SAP/hsti/index.html)

- **Further Information regarding DropTES Programme and Applications:**

- [\*\*hsti-droptes@unoosa.org\*\*](mailto:hsti-droptes@unoosa.org)



## Thank You very much for Your Attention



**Claus Lämmerzahl**

**ZARM FAB mbH**

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