Access to Space for All Initiative
DropTES 8th Round
Q&A Session

UNITED NATIONS
Office for Outer Space Affairs

CENTER OF APPLIED SPACE TECHNOLOGY AND MICROGRAVITY

ZARM

DLR Deutsches Zentrum für Luft- und Raumfahrt

What is DropTES?

- A fellowship programme between United Nations Office for Outer Space Affairs (UNOOSA), ZARM (Center of Applied Science Technology and Microgravity) and DLR (German Aerospace Center) which started from 2014, implemented under the Access to Space for All Initiative.
- Aims to provide educational or research institutions with opportunities to conduct a series of microgravity experiments at the Bremen Drop Tower in Germany.
- The drop tower experiment series consists of 5 drops or catapult launches to be conducted within one week. Each experiment series is accompanied by an on-site experiment integrations taking place one week prior to the campaign.

Photo credit: ZARM

Why DropTES?

- The Bremen Drop Tower is one of the tallest drop towers in Europe and the experiment duration has been extended to 9.3 seconds which is unmatched by any other drop facility worldwide.
- Testing in a microgravity environment represents an achievable entry point to acquire new knowledge and conduct various tests in many different research fields such as astrophysics, biology, chemistry, combustion, fluid dynamics, fundamental physics, and material sciences.
- The Space Administration section of DLR will bear the cost to conduct the series of experiments. ZARM will provide technical support during the campaign along with on-site apartment for student accommodation. UNOOSA will provide financial support for the travel of the selected team.

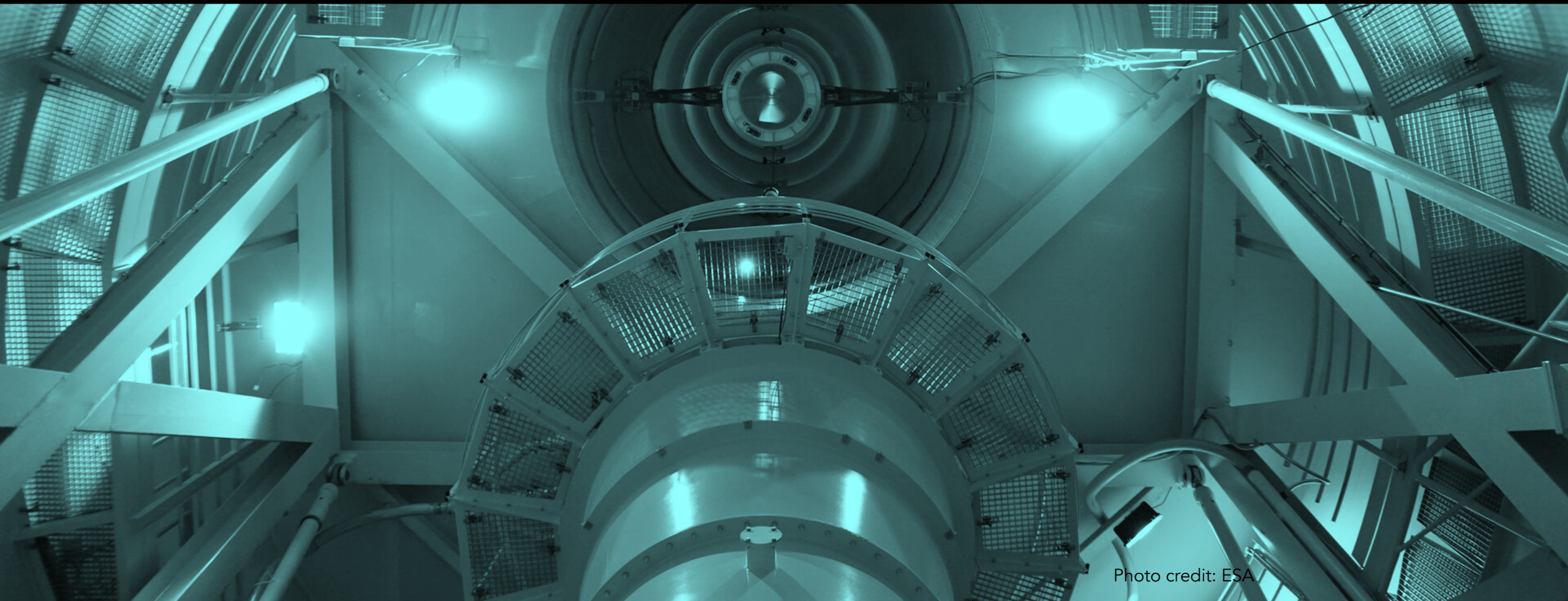

Photo credit: ESA

Photo credit: ZARM

DropTES for Sustainable Development Goals (SDGs)

DropTES may contribute to the SDGs below by fostering innovation and supporting education and training on skillsets for developing cutting-edge technology.

SDG4 "Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all";

SDG 9 "Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

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	Winner	Objective
1st round 2014	German Jordanian University JORDAN 	to investigate the stability of tether dynamics for satellites with electromagnetic tether systems using a Tilger, a mass damper
2nd round 2015	Universidad Católica Boliviana “San Pablo” BOLIVIA 	to examine and evaluate the property of an alloy of Nickel and Titanium "Nitinol" under the microgravity environment
3rd round 2016	Instituto Tecnólogico de Costa Rica Universidad de Costa Rica COSTA RICA 	to expand the technical knowledge and information on the behaviour of a reduced-scale robotic arm manipulator such as dynamics, motion, and control under microgravity conditions
4th round 2017	Warsaw University of Technology POLAND 	to verify, in vacuum and microgravity conditions, the deployment of the deorbit sail system on their two unit CubeSat called "PW-Sat2"
5th round 2018	University of Bucharest Politehnica University of Bucharest ROMANIA 	to expose medicine droplets containing aqueous chlorpromazine (CPZ) solution to both laser radiation and microgravity conditions
6th round 2019	Politecnico de Milano (Polimi) ITALY 	to analyze the lateral sloshing of a ferrofluid solution in low-gravity with the aim of measuring its oscillation frequency while subjected to different magnetic field intensities.
7th round 2020 *experiments delayed to 2021	Universidad Católica Boliviana “San Pablo” BOLIVIA 	to determine the 3D printing feasibility under microgravity conditions, measure intra-structure remaining liquid resin after light exposure and compare manufacturing time, amount of used material, while processing the same piece between 2 different approaches (Fused Deposition Modeling (FDM) and Digital Light Processing (DLP))

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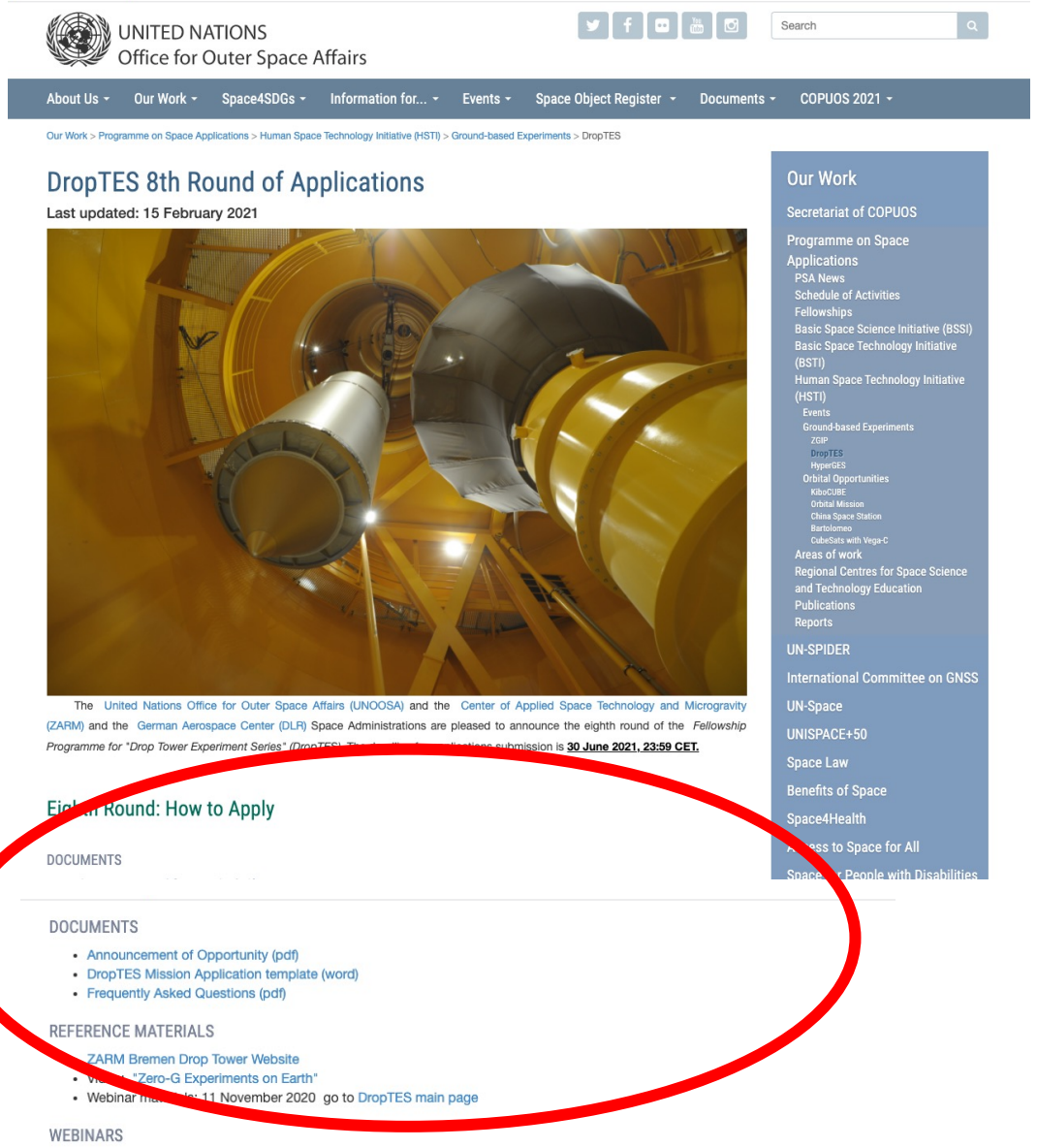
How to apply to the 8th Round

Find the documents at
https://www.unoosa.org/oosa/en/ourwork/psa/hsti/capacity-building/droptes_eighth-cycle.html

❗ PLEASE READ/WATCH!!!!!!
DOCUMENTS
- Announcement of Opportunity
- DropTES Mission Application template
- Frequently Asked Questions

REFERENCE MATERIALS
- ZARM Bremen Drop Tower Website
- Zero-G Experiments on Earth
- Past webinar materials

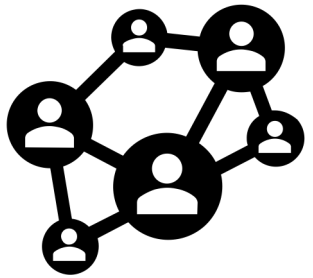


How to apply to the 8th Round

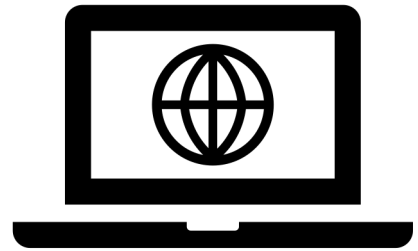
CHECK OUT WEBINARS!!!!!!!

1) How to build a great Application Form: Details of how to fill in the Application form
https://www.unoosa.org/oosa/en/ourwork/psa/hsti/capacity-building/droptes_eighth-cycle.html

2) Series of Webinars on Conducting R&D in Hypergravity/Microgravity :
9 webinars that dive into theoretical, technical knowledge about
what kind of R&D you can do in microgravity, its applications and benefits.
https://www.unoosa.org/oosa/en/ourwork/psa/hsti/kibocube/2020.html



3) Tips for Access to Space for All Application: Various webinars that can help you such as communication/awareness raising of your project, space law/regulations, and innovative technology such as Artificial Intelligence
https://www.unoosa.org/oosa/en/ourwork/access2space4all/accspace4all_tips.html



4) Experiences from Past Winners of DropTES
https://www.unoosa.org/oosa/en/ourwork/psa/hsti/capacity-building/droptes.html

Announcement of Opportunity: Deadline & Opportunity

1. Thematic Area: Access to Space for All - Hypergravity/Microgravity Track

2. Title: Fellowship Programme for Drop Tower Experiment Series (DropTES)

3. Subject: Realization of an own scientific or technological experiment under short-term conditions of weightlessness at the Bremen Drop Tower in Germany.

4. Hosting Institution: Center of Applied Space Technology and Microgravity (ZARM), University of Bremen, Germany

5. Supporting Agency: German Aerospace Center (DLR) Space Administration

6. Executing Agency: United Nations Office for Outer Space Affairs (UNOOSA)

7. Duration: July 2021 – September 2022

8. Deadline for Applications: Completed application forms must be submitted to the United Nations Office for Outer Space Affairs (UNOOSA) **by 30 June 2021 at 23:59 CET**. Applicants will be notified of the outcome of the application by July 2021.

9. Drop Tower Experiment Series: The drop tower experiment series consists of five drops or catapult launches to be conducted at the Bremen Drop Tower in Germany within one week. Each experiment series is accompanied by an on-site experiment integration taking place one week prior to the series week.

10. Expected Profile of Applicants: Heads of research institutions, public organizations or groups, who are university professors or postdoctoral researchers, with a team of Bachelor, Master and/or PhD students.

11. Number of Selected Applicants: One academic supervisor (team leader - Prof./Post-doc/PhD) with up to four students who are from Member States of the United Nations. The teams may be larger, however the financial support listed in section 16 is applicable to the above only.

Announcement of Opportunity: Programme Schedule

14. Programme Outline and Schedule:

UNOOSA offers the selected research team the opportunity to conduct one microgravity experiment series at the Bremen Drop Tower consisting of five drops or catapult launches to be conducted within one week.

Timeline of the Application and Selection Process:

Deadline for Application Submission: **30 June 2021 at 23:59 CET**

Selection of Applicants: **July 2021**

Timeline of the Experimentation Process:

Preparation of the Drop Tower Experiment: **August 2021 - May 2022**

Drop Tower Experiment Series in Bremen: **20 June 2022 - 01 July 2022**

(including experiment integration together with the selected research team on site)

Submission of the Final Experiment Report: **30 September 2022**

D) Schedule of the DropTES Fellowship Programme

July 2021:

- Selection of the winning research team by the Selection Board
- ZARM expert contacts the selected research team (SRT) to initiate the experiment preparation once the team confirms its participation.

August 2021 - May 2022:

- Experiment preparation in close cooperation with ZARM experts
- Submission of the first Experiment Progress Report (EPR) by SRT at the beginning of November
- Critical Design Review (CDR) by ZARM experts soon afterwards
- Submission of the second EPR by SRT at the beginning of February
- Transfer of the experiment and further required equipment to the Bremen Drop Tower in Germany by SRT in May or at the beginning of June depending on customs issues

20 June 2022 - 01 July 2022:

- One week of experiment integration at the Bremen Drop Tower prior to the series week
- One week drop tower experiment series with five drops or catapult launches

30 September 2022:

- Submission of the Final Experiment Report (FER) by SRT

SRT shall update the UNOOSA and ZARM with any publication of results associated with the drop tower experiment series, including, but not limited to, PhD, Master thesis, publications in journals, proceedings and presentation of results at conferences or workshops.

Announcement of Opportunity: Eligibility

15. Requirements for Participants

A) Eligibility Criteria

The DropTES Fellowship Programme is open to research teams from research institutes, universities, and other public organizations that are located in Member States of the United Nations. Each team should consist of up to four Bachelor, Master and/or PhD students who must be endorsed by their academic supervisor (team leader). The teams may be larger, however the financial support listed in section 16 is applicable to the above only. The teams could consist of several entities, with one leading entity that takes responsibility.

It is further required that the proposed experiment be an integral part of the students' syllabuses, that is, part of a Bachelor thesis, a Master thesis, a PhD thesis, or another form of research project associated with the applicants' studies at their respective universities.

The final number of team members who will participate in the experiment series on site at the Bremen Drop Tower depends strictly on the requirements of the experiment and is subject to approval by the Selection Board of the DropTES Fellowship Programme. The Board reserves the right to change or limit the team size if considered necessary.

Changes to the composition of the team are NOT allowed once the application has been submitted. If for exceptional reasons changes are absolutely necessary, they will be subject to the approval of the Selection Board. Priority will be given to teams that have not previously participated in an experiment series at the Bremen Drop Tower and/or research projects that have never been conducted at the Bremen Drop Tower.

Each team applying must be supported by one of its academic supervisors (team leader - Prof./PhD), whose role will be to supervise the work of the students. This person must belong to the same entity as at least one of the students and will be expected to endorse the entire application and development process of the team and bear responsibility for the execution of the experiment.

Applicants must be able to show that they have their respective entities' support through a Letter of Endorsement from their entities' directors.

The balanced participation of women and men in teams as well as supervising positions is encouraged.

Announcement of Opportunity: Selection

B) Selection Criteria

The Selection Board will consist of team members from UNOOSA, ZARM and DLR Space Administration. The Board will assess all applications against the following criteria:

(i) the scientific and/or technological value of the proposed experiment,
(ii) the relevance of microgravity in the proposed experiment,
(iii) the relevance of the drop tower utilisation in the proposed experiment,
(iv) the general feasibility of the proposed experimental set-up and procedure,
(v) the involvement of the proposed experiment in the students' syllabuses,
(vi) the organisation realising the planned research project,
(vii) the overall presentation of the experiment proposal,
(viii) the communication and dissemination plan,
(ix) inclusiveness (e.g. in case of proposals with the same score, the shares of men and women in the teams will be compared. The proposal with higher participation of women will rank higher), and
(x) the link between the project in the Sustainable Development Goals.

The entire selection process will be performed in a single step.

Announcement of Opportunity: Financial Support

16. Financial Support

The selected research team will be offered financial support exclusively for travel purposes. This may include the provision of most economical economy class round-trip air tickets between the participants' international airport of departure and Bremen. En-route expenses or any changes made to the air tickets must be the responsibility of the participants.

In this context it has to be noted that UNOOSA will not bear the expenses for the preparation, transport and shipping as well as insurance of the experiment. Funding to cover these costs must be obtained separately, through private means or through national or international institutions. Applicants and their respective entities are therefore strongly encouraged to find additional sources of sponsorship.

The drops or catapult launches are sponsored by DLR Space Administration. The technical support provided by ZARM is included in those sponsored drops or catapult launches and therefore free of charge.

For the stay of the student team in Bremen, ZARM will provide free of charge its on-site apartment at the drop tower facility, which has two separate rooms with two beds in each room, a bathroom, and a common kitchen. The ZARM apartment can accommodate up to four people.

The academic supervisor (team leader) of the students will be accommodated in a nearby hotel, which shall be basically located in walking distance from the Bremen Drop Tower. Accommodation expenses for the stay of the academic supervisor will be covered by UNOOSA.

Announcement of Opportunity: Submission

17. Application to the Programme:

The **fully completed application documents of the letter of endorsement from the head of the entity** (Document 1) and **DropTES Mission Application** (Document 2) must be submitted to OOSA by 30 June 2021 23:59 CET by email to the following address:

unoosa-access-to-space@un.org

In the email, applying entities are requested to attach scanned copies of the Document 1 and the cover page of Document 2 as pdf-file (.pdf) and the entire document of the Document 2 in pdf. Please note that the OOSA email account only accepts emails with a size limit of up to 10 M bytes. Submission of all necessary documents (Document 1 and Document 2) is mandatory.

UNOOSA and ZARM will then proceed to evaluate each submission. At UNOOSA's, ZARM's, or DLR Space Adminstration's sole discretion, additional information may be requested from applicants, if necessary, to assist in the evaluation of an application. Selected applicants will then be notified with the

results of the selection process. All awards are final and made at the sole discretion of UNOOSA, ZARM, and DLR Space Administration not subject to challenge or review and, are contingent on the successful applicant's agreement to the terms and conditions of the donation agreement of UNOOSA, ZARM and DLR Space Administration.

Q and A

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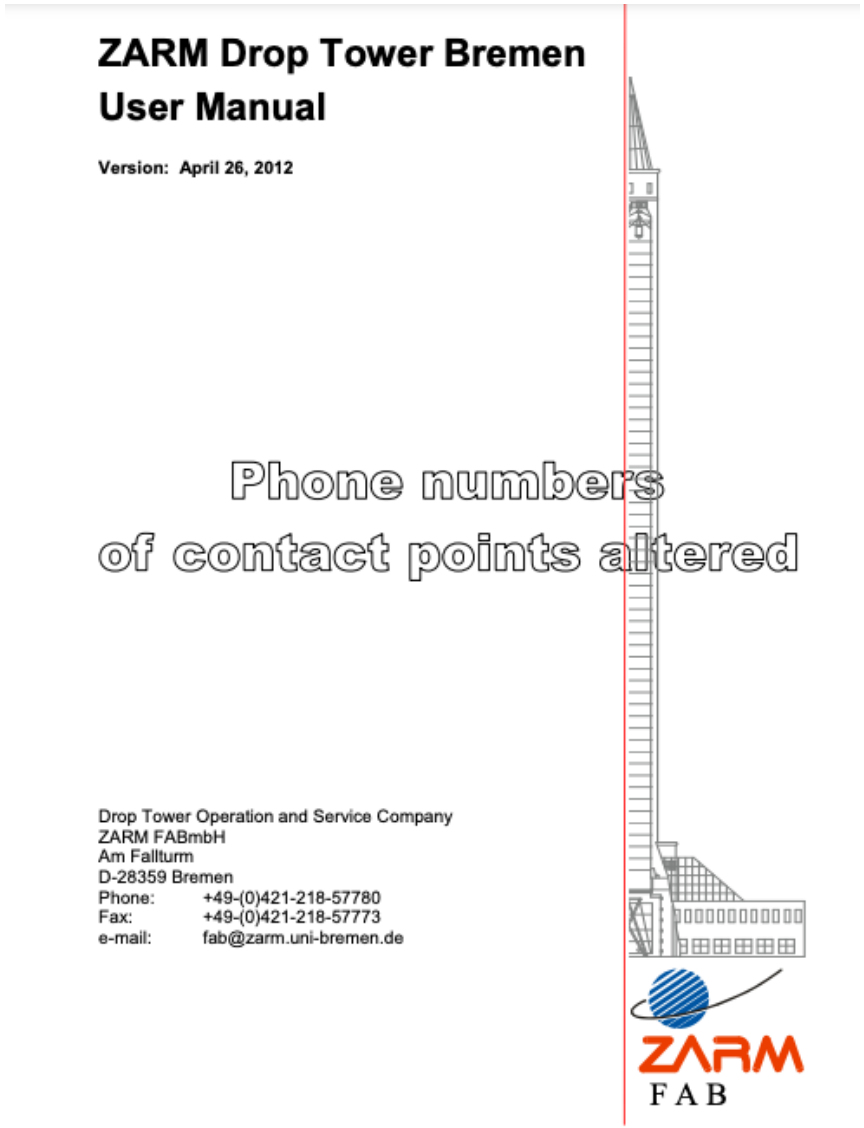
Q: Is there a limit on team members?

A: Each team should consist of up to four Bachelor, Master and/or PhD students who must be endorsed by their academic supervisor (team leader). The teams may be smaller or larger, however considering the workload, we would recommend the size of the team does not exceed 10 members.

Q: What are the applications of microgravity? Where to start learning about what can be done at Bremen Drop Tower?

A: Applications of microgravity are in many research areas, such as combustion, fundamental physics, fluid dynamics, astrophysics, material sciences, etc. New materials can be created in a microgravity environment as there is no gravity force and sedimentation of particles. Also, microgravity is fantastic for creating very homogeneous materials, but there are more examples, and applicants are encourage to read publications on ZARM website (https://www.zarm.uni-bremen.de/en.html) and previous winners' reports (https://www.unoosa.org/oosa/en/ourwork/psa/hsti/capacity-building/droptes.html) on UNOOSA website. Applicants can propose any experiment compatible with the Drop Tower (please check ZARM Drop Tower User Manual - https://www.zarm.uni-bremen.de/fileadmin/user_upload/drop_tower/Users_Manual_0412.pdf) and within the limits of the Announcement of Opportunity. Examples of categories of experiments are material science, combustion, fluid dynamics or technology demonstrators, but do not be constrained, we are looking forward to seeing your new ideas!



Q: How much is the cost of an experiment?

A: Applicants' idea and proposal will decide the cost of the experiment, there is no fixed number, but it varies depending on idea, design, components you use, the facilities you have access to… etc.

Q: Is there a maximum number of applications per research team?

A: An institute could submit more than one application. In that case, please send separate Application Forms, but keep in mind that it is better to have a very good application than several that are just ok.

Q: Is this opportunity covering the cost of taking the experiment to Germany, for example expedition and customs fees?

A: No, fees for the transport of the experiment are NOT covered. For customs fee of the equipment, applicants are encouraged to understand the relevant laws and regulations of the customs in Germany, and the winning team could contact ZARM in advance in seek of help in a possible reduction or exemption of the custom fee (although it is NOT guaranteed).

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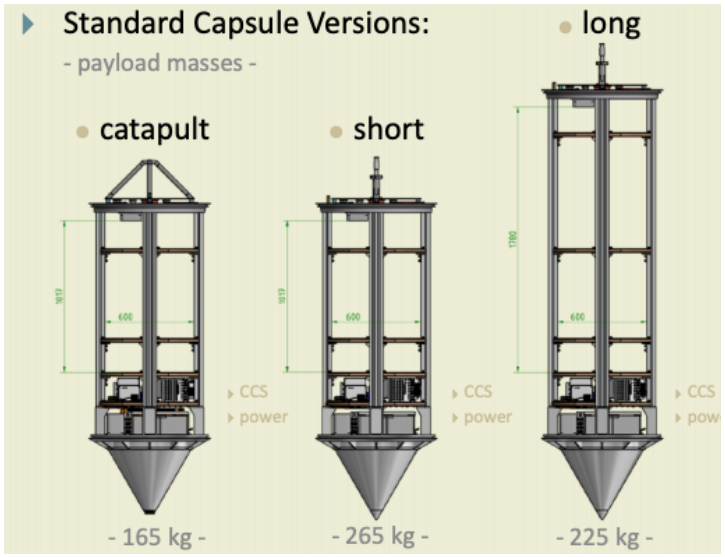
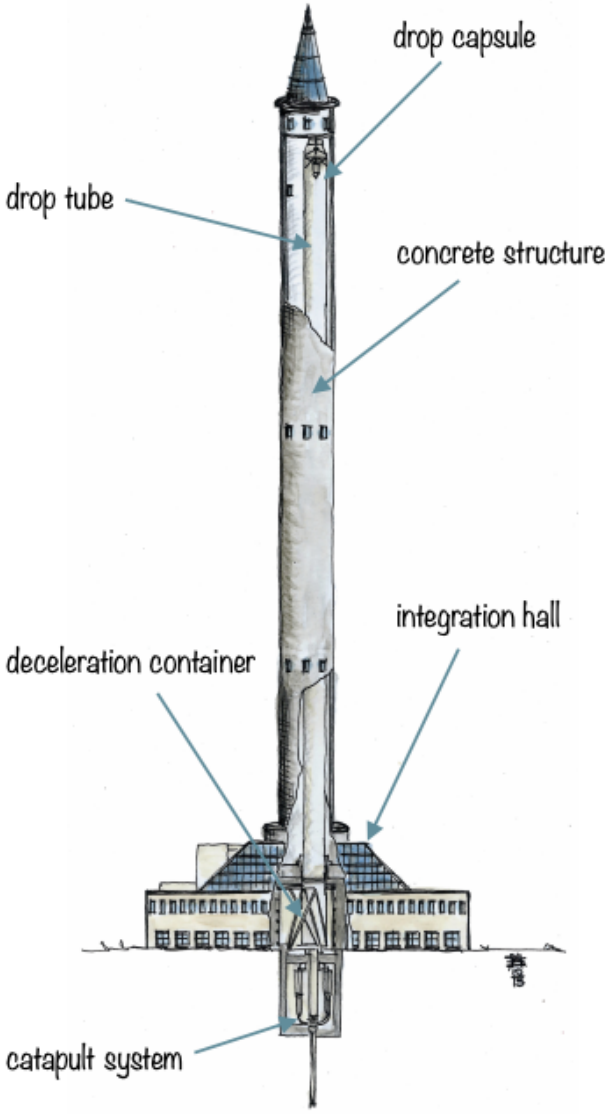
Q: How should we decide on which of the two modes (drops or catapult launches) to use in the experiment?

A: The choice between two modes also depends on the type of experiment, the most significant difference between the two modes is mainly the acceleration phase. In the drop mode, the experiment will have a 1g-to-microgravity transition. For catapult launch, the capsule will take an initial acceleration process, accelerating to around 170km/h in 250ms and the acceleration level is up to 30 times Earth's gravity. Nevertheless, the sophisticated catapult mode offers a smooth transition from the acceleration phase to microgravity. One can put a glass filled with water on the capsule platform - it will not slosh during the catapult acceleration.





Thank you!

For inquires:

UNOOSA Access to Space

unoosa-access-to-space@un.org

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