



## Announcement of Opportunity

### “Access to Space for All” initiative

#### United Nations/European Space Agency Fellowship Programme on the Large Diameter Centrifuge Hypergravity Experiment Series (HyperGES)

Published: 16 May 2022

Application deadline: 18 November 2022

- 1. Thematic area:** Access to Space for All -Hypergravity/Microgravity Track
- 2. Title:** United Nations/European Space Agency Fellowship Programme on the Large Diameter Centrifuge Hypergravity Experiment Series (HyperGES)
- 3. Subject:** Realization of a scientific and/or technological experiment in hypergravity conditions at the Large Diameter Centrifuge facility in the Netherlands.
- 4. Implementation:** HyperGES is being supported by the European Space Agency (ESA), hosted by the European Space Research and Technology Centre (ESTEC) as part of ESA, executed by the United Nations Office for Outer Space Affairs (UNOOSA), and implemented through strong collaboration among UNOOSA, ESA, ESTEC, potential applicants and their organizations from Member States of the United Nations.
- 5. Duration:** Approximately one year following the deadline of applications.
- 6. Deadline for applications: 18 November 2022**

Completed application forms must be submitted to UNOOSA by the deadline, via email to [unoosa-access-to-space@un.org](mailto:unoosa-access-to-space@un.org). Applicants will be notified of the outcome of their applications after selection.

- 7. Hypergravity experiment:** One selected team in each cycle will spend one to two weeks at the ESA’s largest centre, ESTEC in Noordwijk, the Netherlands, to conduct on-site experiment integration and perform hypergravity experiment series on the Large Diameter Centrifuge (LDC), which allows samples to be exposed to acceleration forces of 1-20 times Earth’s gravity. The required actual duration for the selected team to stay in Noordwijk depends on the complexity of the experiment, the proposed experiment schedule, and the negotiation with ESTEC experts.

**8. Expected profile of applicants:** Heads of research institutions or groups, who are university/institution professors or postdoctoral researchers, with a team of Bachelor, Master and/or PhD students.

**9. Number of selected applicants:** One academic supervisor (Team Leader - Prof./PhD) with several students, who are all from Member States of the United Nations with particular attention to developing countries. However, only up to four team members, including supervisor, can be funded by UNOOSA and ESTEC, in which case the supervisor shall indicate the names of four team members to be funded in their application forms.

**10. Language of the programme:** English

**11. Brief programme description:**

UNOOSA is pleased to announce the “United Nations / European Space Agency Fellowship Programme on the Large Diameter Centrifuge Hypergravity Experiment Series (HyperGES)” as part of the UNOOSA’s Access to Space for All initiative and in cooperation with ESA and ESTEC. The fellowship programme is aimed at providing opportunities for scientists and researchers with a team of students from Member States of the United Nations with particular attention to developing countries to conduct their own hypergravity experiment series at the LDC facility located at ESTEC in Noordwijk, the Netherlands.

In order to further understand and describe the influence of gravity in systems, the LDC facility has been developed by ESA allowing the acquisition of a broad gravity spectrum in the range from 1g to 20 g (where g is the gravitational acceleration at the surface of the Earth). It is part of the Life and Physical Sciences Instrumentation and Life Support Laboratory (LIS) at ESTEC, dedicated to serve the science and technology user communities throughout Europe, and now open to all Member States of the United Nations through this fellowship programme.

The diameter of the LDC is eight metres. The LDC has four arms, each of which can support two gondolas with a maximum payload of 80 kg per gondola. In practice, however, up to six gondolas can be used for an experiment plus one additional gondola in the centre for control or reference purposes. The hypergravity field inside the gondolas is simulated by the centripetal forces due to rotation. The LDC facility can provide a hypergravity environment for cells, plants, small animals, physical science and technological experiments. In particular, biology, biochemistry, microbiology, optical physics, material sciences, fluid dynamics, geology and plasma physics investigations can be undertaken in this facility. The LDC is flexible in terms of experiment scenarios, duration and possible equipment to use. This means that the system is able to execute and manage experiments that last from one minute up to six months, without stopping.

The HyperGES fellowship programme is contributing to the promotion of space education and research in hypergravity around the world, particularly for the enhancement of relevant capacity-building activities in developing countries.

## 12. Eligibility criteria

The HyperGES fellowship programme is open to research teams from entities that are located in Member States of the United Nations with particular attention to developing countries. Each team should consist of one academic supervisor (Team Leader - Prof./PhD, not a student), and several Bachelor, Master and/or PhD students.

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 on site at the LDC facility depends strictly on the requirements of the experiment and is subject to approval by the Selection Board of the HyperGES 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 at the LDC facility and/or research projects that have never been conducted at the LDC facility.

The applying academic supervisors (Team Leader) will 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 (including the experiment proposal and team composition) by signing the application form, take care of development process of the team, and bear responsibility for the execution of the experiment.

In addition to the endorsement of the application form by the Team Leader, each Team Member (Team Leader and each student) must be able to show that they have their respective institutions' support through a Letter of Endorsement from their respective institutions. When seeking the Letter of Endorsement, the complete application forms should be presented to their institutions. Team Members belonging to same institution may provide one Letter of Endorsement from that institution.

## 13. Selection criteria

The Selection Board will consist of members nominated by UNOOSA and ESA. The Board will assess all applications against the following criteria:

- 1) The scientific and/or technological value of the proposed experiment,
- 2) The relevance of hypergravity in the proposed experiment,
- 3) The relevance of the LDC utilisation in the proposed experiment,
- 4) The general feasibility of the proposed experimental setup and procedure,
- 5) The involvement of the proposed experiment in the students' syllabuses,
- 6) The organisation realising the planned research project,
- 7) The availability of financial resources to support development, preparation, transportation, and shipping experiment,
- 8) The overall presentation of the experiment proposal
- 9) The communication and dissemination plan
- 10) 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
- 11) the link between the project and the Sustainable Development Goals.

The entire selection process will be performed in a single step, and the results will be announced by UNOOSA.

#### **14. Reference documents**

Applicants are required to refer to the following documents while preparing their applications and experiments:

*1) LDC main features summary*

The main features of the LDC are summarized for easy reference, which is accessible and downloadable from ESA's website at:

[https://esamultimedia.esa.int/docs/edu/Forms\\_Letters/SYT/LDC\\_summary.pdf](https://esamultimedia.esa.int/docs/edu/Forms_Letters/SYT/LDC_summary.pdf).

*2) LDC Experimenter User Manual*

In order to well propose an experiment and facilitate its preparation, it is necessary for applicants to refer to the LDC Experimenter User Manual, which addresses the general features, operations, technical details and technical data of the LDC, and can be accessible and downloadable from ESA's website at:

[https://esamultimedia.esa.int/docs/edu/LDC\\_Experimenter\\_User\\_manual\\_V.3\\_Rev.0\\_14-May-2019\\_ESA-TECMMG-MAN-014129.pdf](https://esamultimedia.esa.int/docs/edu/LDC_Experimenter_User_manual_V.3_Rev.0_14-May-2019_ESA-TECMMG-MAN-014129.pdf)

*3) Technical constraints*

While defining their projects, applicants are advised to keep in mind some technical constraints that apply to their experiments, which can be accessible and downloadable from ESA's website at:

[https://www.esa.int/Education/Spin\\_Your\\_Thesis/Technical\\_constraints](https://www.esa.int/Education/Spin_Your_Thesis/Technical_constraints).

*4) Examples of past experiments*

The past experiments performed in the LDC facility could help applicants propose their own experiments:

[https://www.esa.int/Education/Spin\\_Your\\_Thesis/Examples\\_of\\_past\\_experiments](https://www.esa.int/Education/Spin_Your_Thesis/Examples_of_past_experiments).

#### **15. Overview of second cycle of the HyperGES programme**

UNOOSA offers, in each cycle, one selected research team an opportunity to conduct their proposed hypergravity experiment series at different pre-defined g-levels at the ESTEC/LDC facility for two weeks, including on-site experiment integration prior to the actual execution of the experiment series at the facility.

One cycle of the fellowship programme comprises the following phases: application, selection, preparation, experiment execution, and reporting. In addition, the selected research team is encouraged to publish their experiment results. In general, one cycle lasts around one year after the deadline of applications and before publication of experiment results.

UNOOSA and ESA will conduct technical consultation sessions to provide feedback and advice on experiment ideas. Teams interested in these technical consultation sessions shall submit the expression of interest form containing a summary of their experiment idea. The duration of the technical

consultation sessions will be 1 hour per applying team and will be held between April and October 2022.

**Please note that submitting an expression of interest is not mandatory for selection and technical consultations are optional.**

*Application phase (from announcement of opportunity to application deadline):*

- Applicants to prepare their applications, following this Announcement of Opportunity (AO), the reference documents and the template of the application form along with this AO.
- Teams interested in technical consultation sessions with UNOOSA and ESA to submit the expression of interest form.
- Applicants to have their application forms signed and themselves endorsed appropriately.
- Applicants to submit their completed application forms by the requested deadline.

*Selection phase (within 2 months):*

- The Selection Board to make selection on a winning research team.
- UNOOSA to announce the results and notify the selected research team (SRT) and non-selected applicants of their selection results.
- The SRT to confirm with UNOOSA their participation.
- ESA expert to contact SRT to initiate their experiment preparation.

*Preparation phase (within 7 months):*

- The SRT to prepare their experiment in cooperation with ESA/LDC experts.
- The SRT to submit their first Experiment Progress Report (EPR) to ESA.
- The SRT and ESA/LDC experts to conduct the Critical Design Review (CDR).
- The SRT to submit their second EPR to ESA.
- The SRT to transfer the experiment and relevant equipment to ESA.

*Experiment phase (within 2 weeks):*

- Experiment integration at the LDC facility prior to the experiment series.
- Hypergravity experiment series at LDC facility under different g-levels as defined.

*Reporting phase (within 2 months):*

- The SRT to submit their Final Experiment Report (FER) to the Selection Board.
- ESA/LDC experts to submit their Feedback Report to the Selection Board.

*Publication phase:*

- The SRT to publish experiment results in journals, proceedings, and other media, if possible.
- The SRT to present experiment results at conferences, workshops, and other occasions, if possible
- The SRT members to include the experiment results in their Bachelor thesis, Master thesis, PhD thesis, or another form of associated research projects, if possible.

The SRT shall update UNOOSA and ESA with any information regarding the publications.

Winners are requested to include in their peer reviewed publications, contribution to congresses and other forms of written dissemination with the following sentence:

*The authors would like to thank the support from the United Nations Office for Outer Space Affairs and the European Space Agency (ESA) for the Access to Space for All initiative: HyperGES opportunity, enabling the utilization of ESA's Large Diameter Centrifuge.*

## **16. Financial and technical support**

### *1) International air tickets*

UNOOSA will offer the selected research team financial support exclusively for travel purposes. This may include the provision of the necessary administrative arrangements and defraying the cost of most economical economy class round-trip air tickets, in accordance with the United Nations rules and procedures, for up to four team members between their international airports of departure and Amsterdam (close to Noordwijk), the Netherlands. En-route expenses or any changes made to the air tickets must be the responsibility of the participants.

### *2) Technical support and local accommodation*

ESA/ESTEC will offer local hotel rooms and meals free of charge for up to four members of the selected research team in each cycle during their stay in Noordwijk, the Netherlands for the on-site integration and experiment series.

ESA/ESTEC will be in charge of and operate the LDC facility itself and support the LDC experiments including their preparation and on-site integration. In addition, ESA/ESTEC will provide scientific and technical consulting, service and support to the selected team for smoothly completing the experiment cycle.

### *3) Experiment preparation and other costs*

The selected research team will bear the expenses for the experiment development, preparation, transportation and shipping as well as insurance of the experiment. Funding to cover these costs must be obtained by the selected team, through private means or through national or international institutions. Applicants and their respective entities are therefore strongly encouraged to find additional sources of sponsorship.

## **17. Application to the technical consultation session**

The fully completed expression of interest document must be submitted to UNOOSA by 31 July 2022 23:59 CEST by email to the following address:

[unoosa-access-to-space@un.org](mailto:unoosa-access-to-space@un.org)

UNOOSA and ESA will then proceed to evaluate each expression of interest document. Applicants will then be notified by UNOOSA for the coordination of the session.

## **18. Application to the programme**

The fully completed application documents of the letter of endorsement from the head of the entity (Document 1) and HyperGES Mission Application (Document 2) must be submitted to UNOOSA by 18 November 2022 23:59 CET by email to the following address:

[unoosa-access-to-space@un.org](mailto: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 UNOOSA 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 ESA will then proceed to evaluate each submission. At UNOOSA's, or ESA'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 and ESA 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 and ESA.

## **19. United Nations Privileges and Immunities**

Nothing in or relating to this Announcement of Opportunity shall be deemed a waiver, express or implied, of any of the privileges and immunities of the United Nations, including its subsidiary organs.

## **20. Additional Information**

The latest information on the ground-based experiments, including the HyperGES Fellowship Programme, is available on the website of UNOOSA:

[https://www.unoosa.org/oosa/en/ourwork/access2space4all/HyperGES/HyperGES\\_Index.html](https://www.unoosa.org/oosa/en/ourwork/access2space4all/HyperGES/HyperGES_Index.html)

The information on the Access to Space for All initiative is available at:

<http://www.unoosa.org/oosa/en/ourwork/access2space4all/index.html>

For further information regarding the Fellowship Programme and applications, please contact:

[unoosa-access-to-space@un.org](mailto:unoosa-access-to-space@un.org)