

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)

First Cycle

Published: 17 July 2019

Application deadline: **30 November 2019**

- 1. Thematic area:** “Access to Space for All” Initiative Science Activity
- 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:** The HyperGES is being supported by 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: 30 November 2019**

Completed application forms must be submitted to UNOOSA by the deadline, via email to Mr. Aimin Niu (aimin.niu@un.org), Programme Officer at UNOOSA. Applicants will be notified of the outcome of their applications after selection.

- 7. Hyper gravity 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 20g (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, and 8) The overall presentation of the experiment proposal.

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 is 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.

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

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.

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.

15. Overview of one 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.

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.
- 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 3 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.

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 programme

The fully completed application form, both in PDF format (.pdf) and in MS WORD (.doc), together with the Letter of Endorsements in PDF format, should be emailed to the above designated Programme Officer from UNOOSA, by no later than the submission deadline requested in Section 6 of this document.

The Selection Board will then proceed to evaluate each submission. At the Selection Board'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 not subject to challenge or review.

18. 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.

19. Additional Information

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

<http://www.unoosa.org/oosa/en/ourwork/psa/hsti/ground-based-experiments.html>

The information on "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 Mr. Aimin Niu at: aimin.niu@un.org