



*Ministero degli Affari Esteri  
e della Cooperazione Internazionale*

**DIRECTORATE GENERAL FOR  
CULTURAL AND ECONOMIC PROMOTION  
AND INNOVATION  
ITALIAN REPUBLIC**

**CALL FOR PROPOSALS FOR JOINT SCIENTIFIC EXPERIMENTS TO BE CONDUCTED ON REMOTE CONTROLLED MICRO-  
GRAVITY PLATFORMS IN THE FRAMEWORK OF THE JOINT ITALIAN-ISRAELI LABORATORY ON SPACE ACTIVITIES  
FOR PEACEFUL PURPOSES**

The increased attention paid by the major global space agencies on the interplanetary human space exploration and the growing number of countries interested in exploiting microgravity in low Earth orbit, has extended the importance of research in microgravity.

Thanks to countless technological innovations, the market has broadened and microgravity is now accessible to private and commercial operators. Moreover, the achievements obtained by research on microgravity on the International Space Station, in over fifteen years, has broadened the understanding of the benefits of microgravity for research, technological transfer and commercial potential.

The comprehension of the effects that microgravity has on many terrestrial phenomena offers undeniable advantages. It can help promote projects, products and processes aimed at developing knowledge and technologies required to take further steps toward the exploration of deep space and Mars and can lead to new discoveries on Earth.

Under this call for proposals, the Italian Ministry of Foreign Affairs and International Cooperation, the Israeli Ministry of Science and Technology, in cooperation with the Italian space Agency and the Israeli Space Agency, intend to select joint research projects, proposed by Universities, public and - in the case of Italy only - private research institutes and industries under the areas of cooperation defined in Section A below.

**A. AREAS OF COOPERATION**

Within the framework of the “*Agreement on Industrial, Scientific and Technological Research and Development Cooperation between Italy and Israel*” (hereinafter called the “*Agreement*”), signed in Bologna on 13 June 2000 and the “*Italian-Israeli Joint Declaration on the Constitution of a Joint Laboratory on Space Activities for peaceful purposes*” (hereinafter called “*Declaration*”), signed on 29 January 2018, the *Italian Ministry of Foreign Affairs and International Cooperation* (hereinafter referred to as “*MAECI*”), the *Israeli Ministry of Science and Technology* (hereinafter referred to as “*MOST*”), in collaboration with the *Italian Space Agency* (hereinafter referred to as “*ASI*”) and the *Israeli Space Agency* (hereinafter referred to as “*ISA*”) are issuing the present Call for Proposals to select scientific experiments to be conducted in absence of gravity on remote controlled microgravity platforms. The proposals must be submitted jointly by Italian and Israeli research groups. Up to four experiments will be funded( two by MAECI and two by ASI), to study the effects of microgravity on various chemical, physical, biochemical and biological processes. The experiments will be performed using a satellite provided by ISA that consists in a remote controlled microgravity platform that will be launched in terrestrial orbit on board of a nanosatellite. All the experiments will be calibrated by an Earth control system in order to maximize the results and provide an adequate ground control.

The selected studies will go through the following steps:

1. Testing & adjustment of the experiment to a breadboard system model;
2. Integration on the flight platform;
3. Execution of the experiment on the platform in microgravity.

This call will address the fields of biological, biotechnological, chemical and physical sciences for which it is believed that the effects of microgravity produce clear advantages both in terms of simplification and of research value. The following is a non-exhaustive list of possible experiments:

1. Kinetics of enzymatic reactions
2. Kinetics and formation of emulsion droplets
3. Formation of organic and inorganic crystals
4. Self-assembly of polymers, peptides and DNA fragments
5. Protein crystallization
6. DNA origami
7. Crystallization of new drug polymorph
8. Bacterial virulence and antibiotic drug resistance

## **B. TERMS OF THE COOPERATION**

The proposals must involve the cooperation between Universities, Research Institutes and Companies from the Italian side and Universities and Research Institutes from the Israeli side, whose main activity is the advancement of cutting-edge scientific and technological knowledge and/or their application to industry, which possess appropriate infrastructure and equipment and employ researchers.

In particular for Italy:

In Italy, a research institution is a public or private University or a public or private Center/Research institute acting under the Italian law.

In particular for Israel:

In Israel, an academic or research institution must be one of the following:

- An accredited institution of higher learning in Israel, according to the Council for Higher Education Law, 1958;
- A Research Institute recognized as such by the Israel Science Foundation (ISF);
- A Research Institute which is a nonprofit organization;
- A Research Institute which is a government company or a governmental unit.

For the purpose of this Call, a "Research Institute" is a research institute whose significant portion of activity is the advancement of cutting-edge scientific knowledge, possessing appropriate infrastructure and equipment, and employing researchers who, inter alia, publish articles related to their research in leading scientific journals in the world, and who present their research at international symposia.

Each of the cooperating research groups will be led by a Principal Investigator (PI).

For the Italian side, the Principal Investigator of the project can belong either to a Research Institution, as defined above, or to a private company.

For the Israeli side, the Principal Investigator of the project shall only belong to an academic or Research Institute as defined above. Private Israeli companies may only have the role of subcontractors of the main Israeli Research Institute.

The proposals must fulfill the participation requirements indicated in this call. In addition, the Italian Partners must abide by the additional requirements of the *“Norme integrative per la presentazione di proposte per esperimenti scientifici da condurre in assenza di gravità”* which are to be taken as part and parcel of the present call.

The proposals must contain a detailed description of the research and experiments that are to be conducted.

The Institutions or Companies that submit the project are responsible, toward MAECI and ASI, for any damages caused to third parties during all the development phases of the of the experiments.

The fund recipients must comply with the relevant Italian and EU legislation.

### **C. LEVEL OF FUNDING AND PROJECT DURATION**

MAECI and ASI shall fund each two selected projects up to maximum of a total of 100,000 € for each project, according to the program and the cost estimate presented, to be paid to the Italian subject who presented the project (the fund transfer to the Israeli subject shall be conducted through a Cooperation Agreement, as elaborated in paragraph E). This amount shall account for a maximum of 70% of the total budget of the proposed experiment. The remaining 30% shall be covered by other sources of financing.

The estimate must therefore specify the additional source of the financing to support the costs for the realization of the project, through:

- self-financing from the main Italian or Israeli proponents;
- possible contribution from any other Israeli and/or Italian associated partners ;
- contribution requested to MAECI by the Italian or Israeli subject;
- any other sources of financing.

Projects must have a maximum duration of twenty-four months; the duration may be extended without additional charges for the leading institution due to unexpected postponement of satellite launch services or other unpredictable events up to 4 (four) additional years for a maximum duration of 6 years from the date of funding.

If the proposing or associated Italian and/or Israeli subject obtains profits through the carried out research, the Italian and/or Israeli partner will have to gradually return to MAECI and ASI the amount of the received contribution. The restitution must be made through the payment of royalties, according to the procedures established in art. 5 of the Agreement. No refund is due if the product obtained through the use of registered patents following the experiments conducted does not reach commercialization.

### **D. ELIGIBILITY**

The Principal Investigator for the Italian side (Italian or EU Citizen resident in Italy) must belong to a University or Research Institution or Company under Italian law.

Changes to the submitted budget shall be authorized by the structure to which the proposal was submitted (see section F).

In Israel, proposals for which funding is approved, which involve human beings, must submit the approval of the relevant IRB/Helsinki Committee before the project can commence. For research proposals involving animal experi-

ments - approval by the appropriate institutional committee for the supervision of animal experiments. For research proposals involving experiments with engineered plants and related microorganisms - approval by the Commission for engineered plants.

In Italy, activities shall be carried out in compliance with current Italian and European regulations.

## **E. ADDITIONAL PROVISIONS**

The Italian and Israeli proponents who will cooperate in the realization of the joint projects will have to sign a “Co-operation Agreement” regulating the rights on intellectual property that may derive from the research activity carried out as well as all the most relevance aspects (technical-scientific, financial, use and exchange of human resources, investment for research) related to the project.

The above mentioned Agreement shall include the transfer of funds from the Italian side to the Israeli side to cover the expenses as described in paragraph C.

## **F. SUBMISSION OF RESEARCH PROPOSAL**

The proposals shall be written in English and shared and signed by the Italian and Israeli Principal Investigators, to approve both the scientific approach and the estimated costs. The form in Annex 1 must be used to submit the application. It must be signed by both the Principal Investigators and by the legal representatives of the respective institutions/companies.

Italian Institutions and companies interested in getting in contact with possible Israeli partners may contact the Israeli Ministry of Science and Technology (MOST) at the following email address: [SharonYK@most.gov.il](mailto:SharonYK@most.gov.il) Likewise, Israeli Institutions interested in getting in touch with any Italian partner can contact ASI, at the following email address: [accordo.italiaisraele@asi.it](mailto:accordo.italiaisraele@asi.it)

In order to submit technically feasible proposals, the interested Institutions and companies are advised to contact MOST for the technical and scientific validation of the proposed experiment as soon as possible at the following address: [SharonYK@most.gov.il](mailto:SharonYK@most.gov.il)

**Applications** must be sent by June 11<sup>th</sup>, 2018 ( **two months after the publication of this call for proposals**), exclusively via certified e-mail to the address [dgsp09.pec@cert.esteri.it](mailto:dgsp09.pec@cert.esteri.it), using the form provided for this purpose.

Only documents indicated in the “Integrative Rules for the submission of proposals for scientific experiments to conduct in the absence of gravity” shall be sent, according to the “checklist” in Annex B. If one of the requested documents is not attached to the proposal, it will not be considered admissible.

The proposals shall be drafted according to the technical specifications set out in Annex A.

## **G. FUNDED EXPENSES**

All budget items and expenses must comply with the applicable national regulations.

The contribution under this call for proposals will therefore be provided to support and integrate financial, technical, human and instrumental resources for the realization of planned experiments and research activities.

Only the costs for the conception, design, technical development and execution of the planned experiments can be included in the project budget, as well as the cost for the construction, launch, place in orbit, control, operation and

insurance of the launch vehicle and the satellite. In particular, the expenses that may be included in the scientific budget are, as an example, the following:

- scientific technical staff for the design and execution of experiments;
- technical equipment and instrumentation directly necessary for the planning and execution of the experiments,
- consumables items necessary for experimentation;
- trips and stays between Italy and Israel of the technical-scientific staff involved in the project, necessary for the purpose of its implementation, verification and execution.

## **H. MUTUAL VISITS**

Researchers affiliated to the project are encouraged to spend a significant period of time at the institutions of the other party. Considering that the visits are an integral part of the joint research, the travel and accommodation expenses by the researchers participating in the Call must be included in the estimate of the project presented. The trips will have to take place only in Italy or in Israel.

## **I. PROPOSAL REVIEW**

The proposals will be evaluated by a Joint Italian-Israeli Board referred in the Italian-Israeli Joint Declaration on the Constitution of a Joint Laboratory on Space Activities for peaceful purposes. The proposals will be evaluated according to the following evaluation criteria.

The proposals should involve relevant activities in the areas of interest of ASI and ISA space research and of the relevant scientific communities, and clearly indicate with which methodology, new theoretical approaches and more advanced technologies they will improve cooperation as reported in paragraph A.

1. compliance with the definition of the areas of scientific research of priority interest identified by this call for paragraph A;
2. scientific evaluation: originality and innovation of the proposal within the context of the scientific contents described in the call;
3. significance and relevance of the problems and technical-scientific issues to be carried out in the course of planned activities as well as the potential usefulness and innovation of the methodologies to be adopted;
4. scientific qualifications of the coordinators: they must have adequate experience, excellent technical and scientific skills, ability to manage the cooperation activities between the two parties, and to achieve the expected results of the cooperation;
5. clarity and quality of the proposal: presentation of the object, definition of the objectives, exposure of the methodology and the work program;
6. ability to generate research and development for the belonging structures and to have access to additional public and/or private resources;
7. potential for technology transfer, scientific and/or industrial impact and for commercial development;
8. breadth and usefulness of bilateral cooperation, added value of cooperation between the two countries in the identified priority areas of common interest;
9. spatial relevance of the proposal both in terms of the impact of research for future spatial applications, and in terms of the role of microgravity as a key element for carrying out the study;
10. level of involvement of young researchers.

The Italian authorities reserve the right to request, at each stage of the selection, further information also regarding the suitability of the presented budget.

The Joint Italian-Israeli Board will identify a list of winners.

## **L. NOTIFICATION OF THE RESULTS OF THE SELECTION**

Subsequently, MAECI will communicate to the Italian subjects admitted to the financing, through certified e-mail, the outcome of the evaluation, the proposal for the assignment of the contribution and the conditions for its delivery, as well as the rules for the determination of costs and for the release of technical-scientific and financial reports.

Prior to acceptance of the grant, the winners projects will have to sign with the Israeli partner a “Cooperation Agreement” on the commercialization of the product, process or service, which will commence once the research and development phase has been completed.

The Italian partner must also transmit, via certified e-mail:

- a copy of the Cooperation Agreements referred to above;
- a declaration of formal acceptance of the loan according to the conditions contained in the letter of assignment of MAECI. If the project manager changes during the year, the replacement will be promptly and formally communicated to MAECI for the necessary approval;
- a declaration of acceptance of the public contribution in accordance with the Commission Regulation (EU) no. 1407/2013 of 18<sup>th</sup> December 2013 on the application of Articles 107 and 108 of the Treaty on the Functioning of the European Union to «de minimis» aid;
- Unique Project Code (CUP).

Once the above documentation has been acquired, respectively MAECI and ASI will issue a provision for granting of co-financing for two projects each.

The Israeli authorities (MOST and ISA) will regulate the relations with the Israeli partner according to national procedures and regulations.

The list of selected projects will also be published on MAECI and ASI website.

## **M. AWARDING PROCEDURES AND PAYMENTS**

Both PIs (Italian and Israeli) will present six month reports to the MAECI and ASI and a joint final report (in English with an Italian translation) on the results of the activity carried out and its financial management.

Even outside of what is expressly provided for in this Call, by the Integrative Rules and by the concession provision, the Italian Principal Investigator will have to present specific scientific and/or accounting reports at the request of the MAECI or ASI, to be produced within 30 days of the request.

The payment of the contribution – as well as for the amount due by the Israeli partners – will be made by MAECI and ASI to the Research Institution to which the Italian Principal Investigator belongs according to the regulations in force, with the terms and conditions established by the Integrative Rules and the grant awarding act. The first tranche of payment (30% of the grant) will be made after the submission of a specific request to the MAECI, three months after the acceptance of the grant, as an advance on future expenses. The second tranche of payment (another 30% of the funded amount) will be made within three months from the presentation, by the above-mentioned subject, of a scientific report of the ongoing activities together with the financial statement of the expenses incurred by the Italian and Israeli participants for the experiments and research activities carried out, together with the supporting related documentation. The final tranche of payment will be made within three months from the presentation of the final scientific report as well as the financial statement of the expenses incurred by the Italian and Israeli participants for the experiments and research activities carried out, together with the supporting related documentation that wasn't already submitted to the MAECI in the above-mentioned intermediate financial report. The final payment will not exceed the measure of 40% of the grant. These documents must be presented in English, signed by the Italian or Israeli PI's and must be accompanied by an Italian translation.

**For further information:**

**Ministero degli Affari Esteri e della Cooperazione Internazionale**

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## Annex A: Technical specifications of the microgravity platform

The Israeli provided Microgravity lab platform enables the mixing of different fluids and observing the results visually using a light microscope and physicochemically using a spectrometer. The lab is suitable for chemical and biochemical reactions, studying colloidal systems, self-assembly of polymers and macromolecules, etc. in addition basic microbiology experiments can be executed by the Satellite, such as bacterial growth rate, antibiotic effect, etc. Please note that one restriction on these experiments caused by the launch platform is that since late access and power supply to the rocket is not available, the experiment reagents and the sample tested should be stable at room temperature for several weeks. Nevertheless, after the launch the satellite temperature control is activated and experiments can be executed in the required temperature range (3-37°C). Each experiment will be carried out and monitored, and the resulting measurements and data will be transmitted to the ground station for further analysis and evaluation.

The experiments are placed inside a pressurized atmospheric box. The lab is divided into four sections (experiments), with two experiments on each cassette. Each experiment contains two reservoirs (A&B) connected directly to the observation chamber, a main chamber (M) and a third reservoir © which is connected to the observation chamber through their main chamber. The observation chamber is shared for all experiments and is observed through a light microscope and a spectrometer (wavelength: 420-750 nm).

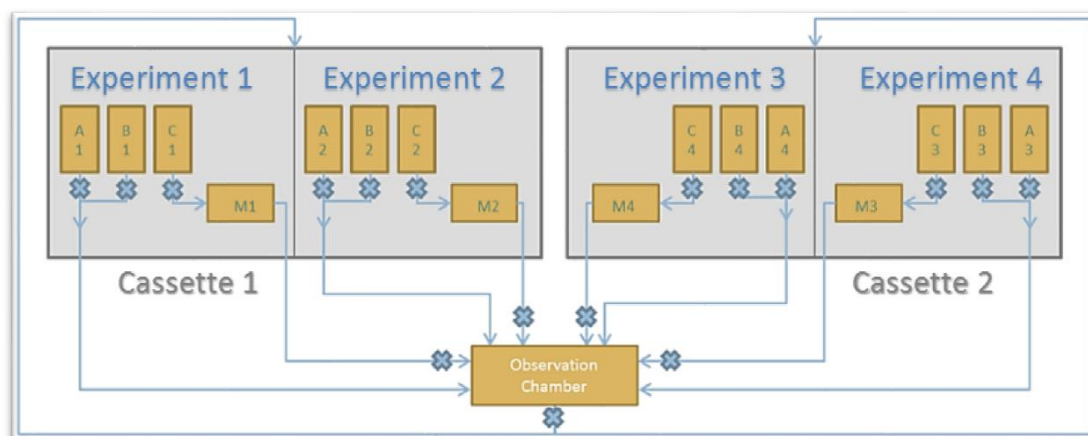


Figure 1: Lab fluid flow layout

### 1. Physical

- Total mass: 2.5 kg.
- Atmospheric box dimensions 95x95x71 mm.
- The lab is a closed system where the waste is located behind the chambers. The system cannot have any air inside it, since air bubbles can block the tubing in microgravity.

### 2. Environmental

- Temperature: 37-3[SY1]\* °C. \* Based on analysis. Active heaters are placed in order to prevent liquid freezing \*\* Temperature control starts just after launch.
- Pressure: 1 bar.

### 3. Fluid handling

- Chamber volume: main 0.5 or 1.0 mL, observation 1mL, flushing 1mL.
- Tubing inner diameter: 0.76mm or 1mm.
- Stirring rate: 60-300 RPM.

### 4. Monitoring

- Temperature reading accuracy:  $\pm 0.25$  °C.



- Pressure reading accuracy:  $\pm 2\%$ .

## 5. Characterization

### 5.1 Microscope (depending on chosen objective)

- Field of view: 1.28 x 0.96 mm<sup>2</sup>.
- Magnification: x5.
- Pixel resolution 0.64  $\mu\text{m}$ .
- Depth of field 24.4  $\mu\text{m}$ .

### 5.2 Camera

- Color filter array: RGB Bayer pattern.
- Bit depth: 10 bit.
- Dynamic range 61: dB.
- Ability to compress to jpg images from raw format (to reduce size of image).
- Active pixels 2,048H x 1,536V.
- Pixel size: 3.2 $\mu\text{m}$  x 3.2 $\mu\text{m}$ .

### 5.3 Illumination

- Color: cool white (5000-5650 K).
- Luminous flux: >100Lm
- Light emitting surface 1.4 x 1.4 mm<sup>2</sup>.

### 5.4 Spectrometer

- Wavelength: 420-750 nm.
- Optical resolution 1.5 nm FWHM.

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YEAR 2018

**ANNEX B – ONLY FOR THE ITALIAN SUBMITTING PARTNER**

**Check List of the documents that must be attached**

(to be transmitted by PEC with max 10MB of annexes)

PLEASE MARK THE BOX IN CORRESPONDENCE OF THE FILE ATTACHED.

1. ☐ **APPLICATION FILE (ANNEX no. 1), comprehensive of:**
  - the Civil Registry Part.
  - the Descriptive Part of the Project.
  - the Estimate of expense.

(to be transmitted by PEC with **just one file** named **ACRONYM PROJECT.1**).
2. ☐ **FILE ANNEX no. 2**  
**For Public Participant**
  - Substitutive declaration of certification and/or act of notoriety for Public Participants.
  - Copy of the identity document of the person who signs the Declaration..

(to be transmitted by PEC with **just one file** named **ACRONYM PROJECT.2**).
3. ☐ **FILE ANNEX no. 3**  
**for Private Participant**
  - Substitutive declaration of certification and/or act of notoriety for Private Participants.
  - Copy of the identity document of the person who signs the Declaration.

(to be transmitted by PEC with **just one file** named **ACRONYM PROJECT.3**).

**N.B. In case the public and private subjects participate together at the Call, both FILE nos. 2 and 3 must be completed and attached.**