

# R&D WITH ESA – SLOVENIA

*An overview of Discovery Research and the Open Space Innovation Platform*

Advanced Concepts and Studies Office  
European Space Agency

05.03.2026



## How can ESA support your novel ideas?



**Blue-sky and externally driven research:** Shaping the future of space exploration and technology through novel, disruptive, innovation.



**Open science:** Open Space Innovation Platform (OSIP) the entry point for startups and newcomers to ESA/space.



**Continuous Interaction:** Fast feedback and engagement with ESA experts at all stages of the process, including research stays.

### RESEARCH GATEWAY- OSIP

1. Go to [ideas.esa.int](https://ideas.esa.int) and look for thematic **Campaigns** or enter the **Open Ideas Channel**
2. Check whether your idea is **novel and eligible** – in case of doubt: ask on OSIP
3. **.Submit** your idea and start discussing with **ESA experts**



# SEEDS OF DISRUPTIVE INNOVATION





## ESA's framework to **discover** and **explore** the **disruptive innovation** of tomorrow

- Via the **Open Space Innovation Platform (OSIP)**
- **External driven**: Reaching out for ideas from anybody
- **Lowest entrance barrier** to ESA
- **Fast, simple and transparent**
- **Research**, studies and early technology development

→ DISCOVERING TOMORROW'S INNOVATION

[esa.int/discovery](https://esa.int/discovery)

[ideas.esa.int](https://ideas.esa.int)

[activities.esa.int](https://activities.esa.int)

ESA UNCLASSIFIED – For ESA Official Use Only

>20k Users  
 >60k interactions  
 >4.5M page views  
 fast feedback



**OSIP**  
OPEN SPACE INNOVATION PLATFORM

>10 000 Ideas  
(>3400 Discovery)

~650 signed Discovery contracts

>2900 selected Ideas  
(>1000 Discovery)

### Discovery year in numbers:

**~160**  
activities

**100%**  
Industry/Academia driven  
Open Competition

**~18m€**  
contracts

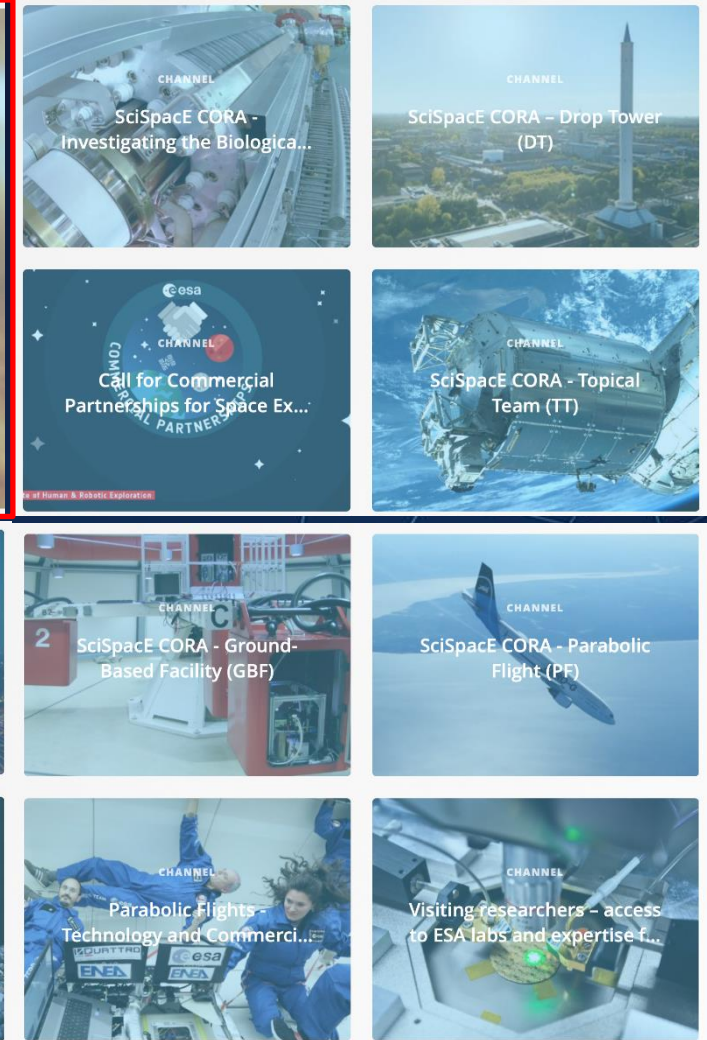
**~80%**  
SME's, R&D inst. and academia



Initiated by Discovery & Preparation but now joined by many more ESA programmes

- **Campaigns:** thematical & time limited
- **Channels:** broad scope & constantly open

Most natural starting point → **Open Discovery Ideas Channel**





# GET YOUR PROJECT (co-)FUNDED BY ESA



You have a novel idea relevant to space? Then follow these three steps:

1. Go to [ideas.esa.int](https://ideas.esa.int) to **Open Discovery Ideas Channel**
2. Verify **idea novelty and eligibility** (see Channel description)
3. **Submit your idea** and start discussing with ESA experts

## Process: idea to contract

### Your Novel Idea

Register with email  
 Short idea description  
 No need for formalities  
 Submit any time

### OSIP

ESA gives feedback  
 ESA channels to best implementation path  
 Monthly evaluation  
 Best ideas invited to be matured into proposals

### Discovery Contracts

Following competitive evaluation of proposal  
 Implementation through:

1. Studies (100k)
2. Early Technology Dev. (175k)
3. **co-sponsored Research (90k co-funded)**



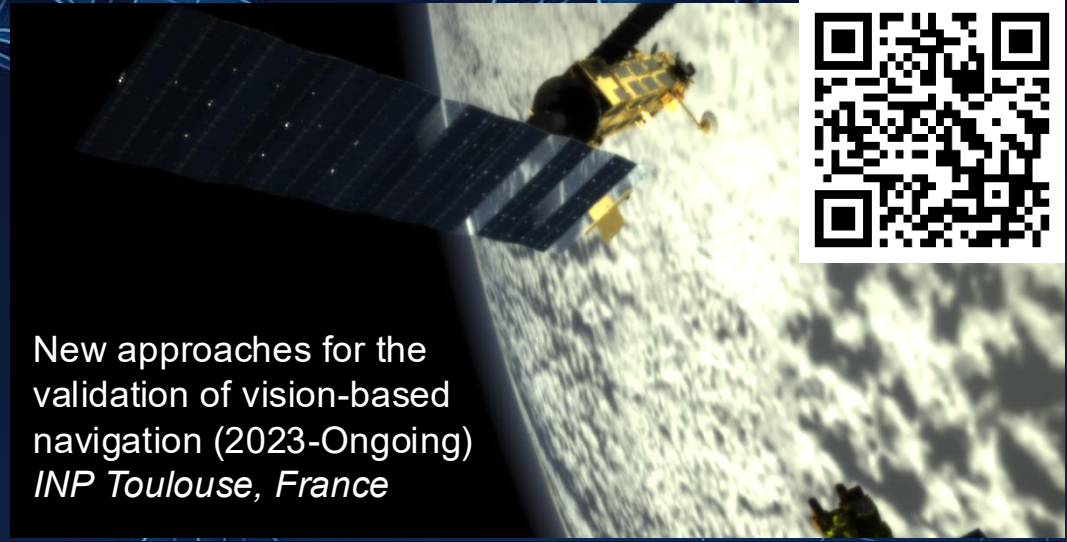
[ideas.esa.int](https://ideas.esa.int)  
 Open Discovery Ideas Channel



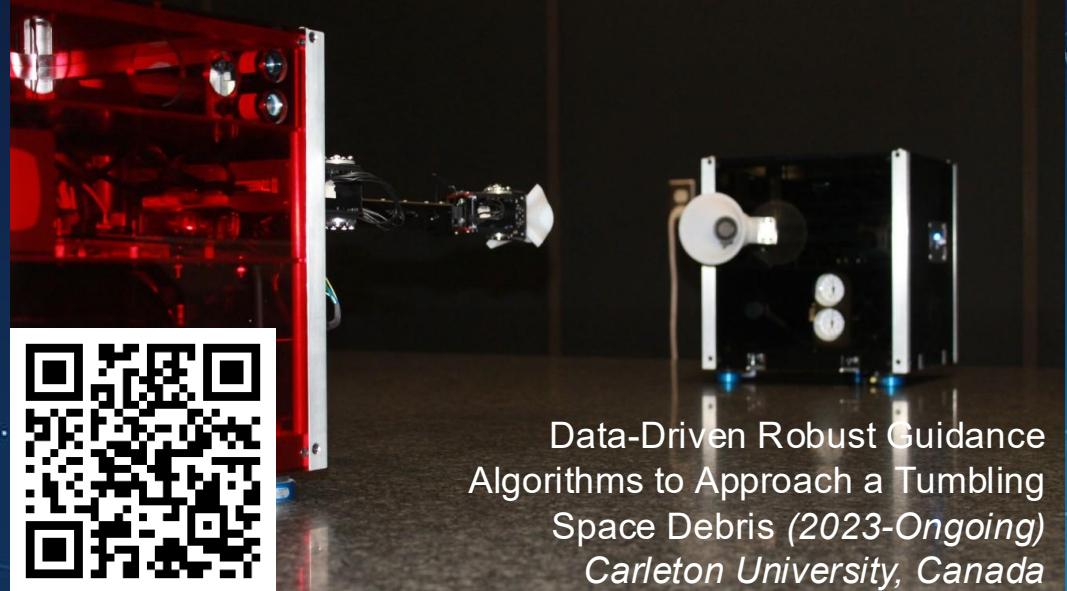
# COSPONSORED RESEARCH



- **ESA budget** up to **90k€** ; Co-funding required (min. 50%.)
- Type of activities supported
  - **PhD** (typically taking 3 years)
  - **Advanced research** (e.g. post-doc or senior research projects) typically between 6-36 months
- Key **topics** and **trends** include:
  - Artificial and Embodied Intelligence
  - Neuromorphic Computing
  - Advanced Materials & Manufacturing
  - Biotechnology & Sustainability
  - Quantum Technologies
- Guidance: formulate a clear **research** question and highlight the **novelty** vs. existing **scientific** literature



New approaches for the validation of vision-based navigation (2023-Ongoing)  
*INP Toulouse, France*



Data-Driven Robust Guidance Algorithms to Approach a Tumbling Space Debris (2023-Ongoing)  
*Carleton University, Canada*





# VISITING RESEARCHERS AND ACCESS TO ESA LABS



Visiting Researcher schemes aim to support research projects that would benefit from ESA labs, facilities or expertise

## Co-sponsored visiting researcher

Nominally up to 1 year at the ESA site where the ESA Co-supervisor is located.

> 60 researchers

## Visiting researcher channel:

For any funded research project at (post)-Doctoral level.

- 36 researchers
- 12 participating labs



<p><b>Physics-Based Validity Maps of Linear and Non-Smooth Slush Reduced Order Mode...</b></p> <p>By Gianni Cassoni</p> <p>GNC, AOCS &amp; Pointing Laboratory Community Discussion</p>	<p><b>Making Science Satellites Think: Resilient On-Board Processing for the THESEUS...</b></p> <p>by Gianluca Furano and 2 others</p> <p>Data Systems, Microelectronics and ... <b>Selected</b></p>	<p><b>LEO Environmental Impact on PZT-Based SHM Systems: A Study on Long-Term Accu...</b></p> <p>By Theodora Kryparakou</p> <p>Materials, Manufacturing and Assem... <b>Selected</b></p>	<p><b>Enabling MBSE for the in-orbit demonstration of future space exploration inf...</b></p> <p>By Samuele Enzo</p> <p>Systems and Concurrent Engineerin... <b>Selected</b></p>
<p><b>From Degradation Data to Design and Operations Optimization: A Mission-Aw...</b></p> <p>by Davide di Ienno and 5 others</p> <p>Data Systems, Microelectronics and ... <b>Selected</b></p>	<p><b>Physics-Informed Machine Learning for Safe Learning-Based Control in Space App...</b></p> <p>by Iliario Cantiello and 2 others</p> <p>GNC, AOCS &amp; Pointing Laboratory <b>Selected</b></p>	<p><b>Mathematical Optimization Models for Strategic Interactions in Multi-Actor S...</b></p> <p>By Adam Abidin</p> <p>Advanced Concepts Team <b>Selected</b></p>	<p><b>Smart models, simple tuning: mastering closed kinematic chains in future spacecraft ...</b></p> <p>by Fabrice Boquet and 6 others</p> <p>GNC, AOCS &amp; Pointing Laboratory <b>Selected</b></p>

**CHANNEL**

Visiting researchers – access to ESA labs and expertise for your research projects

Innovation Area: Discovery

[Submit Your Idea](#)



# ADVANCED CONCEPTS TEAM



ESA's research think-tank, exploring with academia beyond the programmatic horizon

[www.esa.int/act](http://www.esa.int/act)

# 769

OPEN SCIENTIFIC PUBLICATIONS ON ADVANCED SPACE CONCEPTS

# > 100000

DOWNLOADS OF ACT OPEN-SOURCE SOFTWARE

# 23

RUNNING PROJECTS INCLUDING

- Neural ODEs for Space Applications
- Keplerian Travelling Salesman Problem
- Fast and Efficient Asteroid Geodesy with MasconCubes
- Memristor based Neural Network Accelerators
- Automated Reasoning for Quantum Computing
- Quantum Distributed Sensing using Graph States
- Quantum Causality
- Totimorphic Structures for Space Applications

# >500

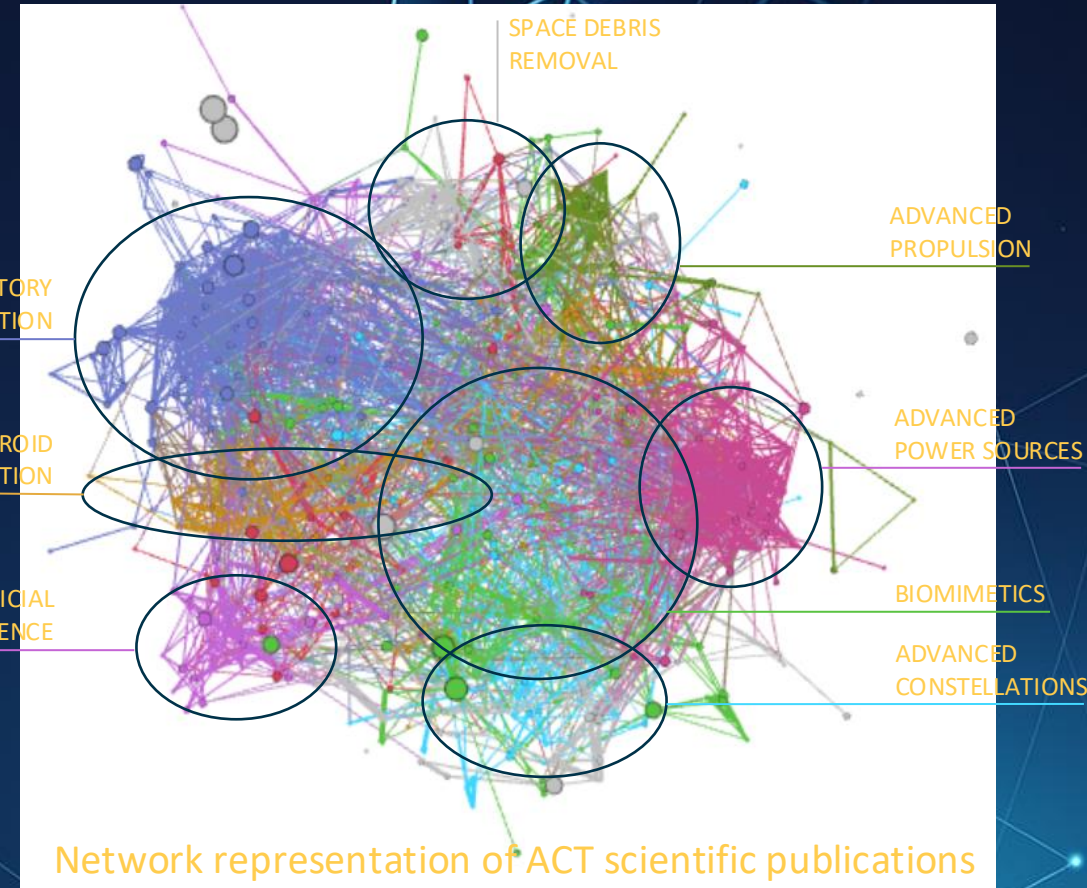
SCIENTISTS PARTICIPATING IN OPEN COMPETITIONS ON KELVINS DATA SCIENCE PORTAL

# >1000

CO-AUTHORS IN EU ACADEMIA

# 125

ARIADNA STUDIES WITH UNIVERSITIES



Network representation of ACT scientific publications

## Competitions: Kelvins, Optimize, GTOC, SOCIS

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# DISCOVERY— OPEN FOR YOUR DISRUPTIVE IDEAS



[esa.int/education](https://esa.int/education)

4433 IDEAS



PhD



Post-Doc

## Co-Sponsored Research

Max 90k from ESA, max 50% ESA funding

[activities.esa.int](https://activities.esa.int)

## Visiting Researcher

Funded, employed researcher  
Comes with own funding

ESA co-supervisor  
- collocation option

90 Collocated Researchers

Research Results

[nebula.esa.int](https://nebula.esa.int)



ESA ACT

Natural link to research community and academic network

[esa.int/act](https://esa.int/act)

ESA hosting lab

- 12 labs
- Mutual interest



OSIP  
OPEN SPACE INNOVATION PLATFORM

[ideas.esa.int](https://ideas.esa.int)

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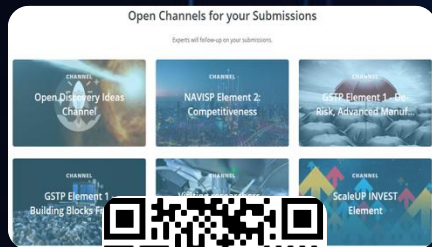




# USEFUL LINKS



- Channel and Campaign.
- Entry to Discovery Element
- Submission of pre-proposals and outline proposals for GSTP.



- Registration of new companies
- Invitations to tenders.
- News/Procurement related announcements: Preparation, TDE WP, GSTP Compendia Publication



## Activities Portal

- Running activities
- Visibility on interim results and publications
- Updated by contractor
- Simplified interaction with ESA



## Discovery and Preparation

- Discovery & Preparation
- Highlights



## shaping the future

- TDE/GSTP information
- TDE/GSTP achievements
- Reports & highlights



## Nebula Public Library

The knowledge bank of ESA's R&D programmes

- Discovery, Preparation activities achievement summary
- TD,E and GSTP public summaries



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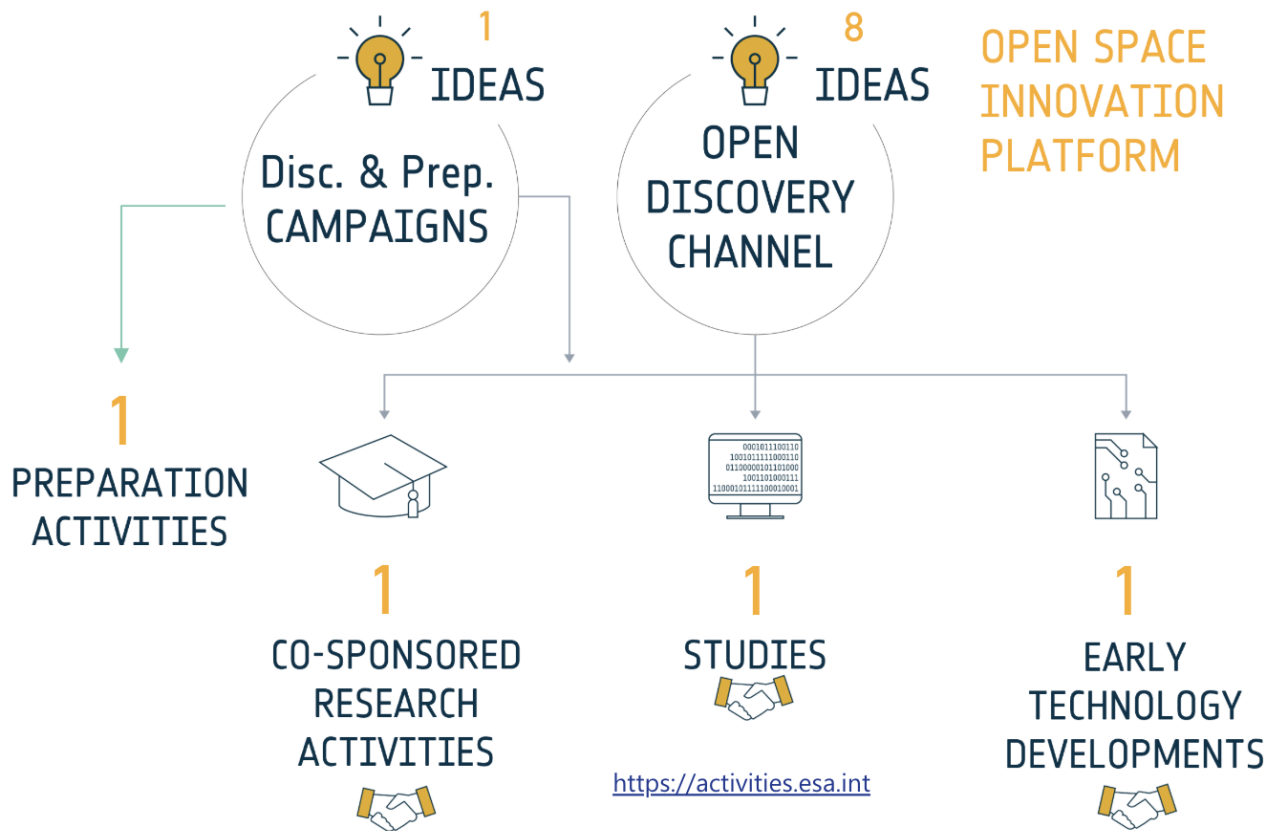
→ THE EUROPEAN SPACE AGENCY



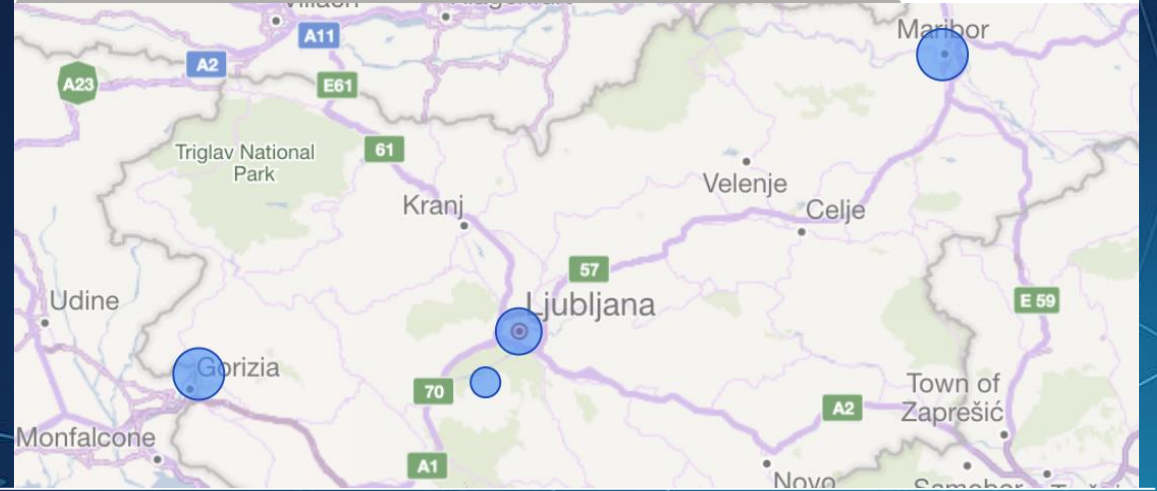
# DISCOVERY - IDEAS FROM SLOVENIA



## 9 IDEAS



AALTA LAB D.O.O.	<u>Lunar Relativistic Positioning System - LUREPOS</u>
Duol	<u>Study of Opportunities for Elastocaloric Cooling and Heating Technology in Space Applications – SPACECOOL</u>
SKYLABS D.O.O.	<u>CUBE (CME Catcher Carousel)</u>
UNIVERSITY OF LJUBLJANA, FACULTY OF MECHANICAL ENGINEERING	<u>Development of tailored surfaces for a more efficient production of Hydrogen and Oxygen in-space via PEM electrolysis</u>
UNIVERSITY OF LJUBLJANA, FACULTY OF MECHANICAL ENGINEERING	<u>Study of Opportunities for Elastocaloric Cooling and Heating Technology in Space Applications – SPACECOOL</u>
UNIVERSITY OF MARIBOR	<u>CUBE (CME Catcher Carousel)</u>
UNIVERSITY OF MARIBOR	<u>DEVELOPMENT OF NEW COMPOSITE MATERIAL BASED ON CARBON FIBRE AND CHITIN FROM THE FUNGUS</u>
UNIVERSITY OF MARIBOR	<u>Radiation Assessment on GaN based bridge designs for future space missions</u>





# DISCOVERY - IDEAS FROM SLOVENIA



## DEVELOPMENT OF NEW MYCELIUM COMPOSITE ENGINEERING MATERIAL WITH IMPROVED MECHANICAL PROPERTIES USED FOR ADDITIVE MANUFACTURING

Overview Events Reports Assessments Forum Members

**RUNNING**

**Prime contractor**  
University of Maribor

**Organisational Unit**  
TEC-MSE

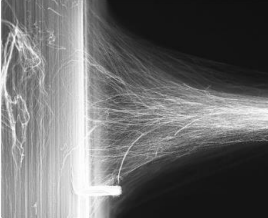
**Implementation progress**  
67%

**START (commitment date)**  
07 March 2022

**ESTIMATED END**  
07 March 2025

**DURATION: 36 MONTHS**

**Activity Type**  
co-sponsored Research



### Objective

The subject of the doctoral research is the production of micelle material which is part of mycelium composition and has so far proved to be a durable material for all-round use, such as the furniture, bricks, containers etc... The task is based on researching the material properties and potential possibilities of its use, as well as finding an alternative to traditional synthetic materials and encouraging reflection on the use of non-durability and ecologically objectionable materials. Fungal mycelium properties can be manipulated by the choice of substrate, type of fungus and post-treatment. Thus, in bio composite materials several properties can be found, such as complete biodegradability, toughness, lightness, resistance to fire and water, etc. The possibility of changing its properties consequently allows us to use the material for different purposes. Fungal mycelium is mainly composed of natural polymers such as chitin, cellulose, protein, etc., so it is a natural polymer composite fibrous material. Based on mycelium's unique structure and composition, we anticipate the development of various materials, which offers plenty of space for improvements and further development of materials.. Due to its potential, we want to realize the idea of making new mycelium composite engineering material with improved mechanical properties used for additive manufacturing. The production of this material would take place in several stages. The first steps would follow the already known procedures, while the next steps would follow the described method with the equipment that we have at our university.

**Contract number**  
4000137542

**Technical contact person(s)**  
• Malgorzata Holynska

**Programme**  
Discovery

**Activity Id**  
21-D-R-TEC-45

**OSIP Idea Id**  
I-2021-02671

**OSIP Proposal Id**  
I-2021-03377

**Related OSIP Campaign**  
Open Discovery Ideas Channel

**Main application area**  
Exploration

**Budget**  
90000€

## STUDY OF OPPORTUNITIES FOR ELASTOCALORIC COOLING AND HEATING TECHNOLOGY IN SPACE APPLICATIONS – SPACECOOL

Overview Events Reports Assessments Forum Members

**RUNNING**

**Prime contractor**  
UNIVERSITY OF LJUBLJANA,  
FACULTY OF MECHANICAL  
ENGINEERING


**Organisational Unit**  
TEC-MTT

**START (commitment date)**  
19 June 2025

**ESTIMATED END**  
19 June 2026

**DURATION: 12 MONTHS**

**Activity Type**  
Study



### Objective

Heat management in space presents one of the key challenges due to extreme conditions. Systems ranging from small satellites, through complex spacecraft and stations, to future Moon and Mars habitats demand precise temperature control for electronics, life-support, and scientific operations. Established passive systems (heat pipes, radiators, etc.) have limitations, and active heat pumps are needed for precise thermal control and heat lift to high temperature level. However, vapor-compression systems are unsuitable for space, thermoelectrics are inefficient, and cryocoolers are bulky. Efficient, lightweight, and robust solutions are essential for future missions. Elastocaloric is a novel technology, based on solid shape memory materials and shows great promise in many applications. The U.S. Department of Energy recognised it as the most promising future heating and cooling solution, and the World Economic Forum lists it among 2024's top ten emerging technologies. Elastocalorics rely on solid-state phase changes triggered by mechanical stress, absorbing or releasing latent heat and operate without harmful refrigerants. This environmentally benign, recyclable technology can provide high-efficiency, silent, compact, and modular systems for both miniature and large-scale applications, covering wide temperature ranges. During this study, we will (i) Identify space applications thermal management needs and environmental constraints, from microsattellites to future Moon/Mars habitats. (ii) Evaluate the elastocaloric potential and the effect of the space environment on the elastocaloric technology. (iii) Develop and evaluate preliminary concepts; and (iv) Develop a numerical model, perform simulations, and compare the performance of the most promising concept with the state-of-the-art technology. The results will give a clear overview of the possibilities of using elastocaloric technology in space applications and will open new perspectives for sustainable solutions on Earth.

**Contract number**  
4000148718

**Technical contact person(s)**  
• Stephane Lapensee

**Programme**  
Discovery

**Activity Id**  
CA\_S\_I-2024-11686

**OSIP Idea Id**  
I-2024-11686

**OSIP Proposal Id**  
I-2025-02086

**Related OSIP Campaign**  
Open Discovery Ideas Channel

**Budget**  
100000€

