The 7th Mission Idea Contest
For Deep Space Science and Exploration

The University of Tokyo, Institute for Open Innovation

# Introduction to 7th Mission Idea Contest (MIC7) and Lecture Series for Deep Space Science and Exploration with Micro/Nano Satellites

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UNISEC GLOBAL
University Space Engineering Consortium

# MIC7 Overview

- The MIC7 offers aerospace engineers, scientists, college students, consultants, and anybody interested in deep space science and exploration with opportunities to present their creative ideas and gain attention internationally.
- Important dates: 07/8; 08/18; 09/30; 11/TBD
- Abstract submission due: **July 7 2021**
    - Notification: August 18 2021
    - Full Paper submission due: September 30 2021
    - Final presentation: TBD (around Nov 20, 2021
- Award: 1st place, 2nd place, Student prize, other(TBD)

Note: Final presentation may be pre-recorded or live dependent on COVID19 travel restrictions.

**http://www.spacemic.net**

# Requirements

- Propose an innovative experiment idea which contributes to deep space science and exploration.
- Other requirements:
  - Spacecraft envelope size is less than 1.0 m x1.0 m x1.0 m size with less than 100 kg in weight (Multiple satellites are acceptable within the envelope area).
  - cis-lunar orbit or deep space trajectory orbit with the relative velocity to the Earth (excess velocity) greater than 0 km/s and the deliverable spacecraft mass is shown in Fig. 1.
  - You can use a transponder onboard of PROCYON.
  - You can assume you can use earth ground stations for deep space missions like DSN (Deep Space Network).
  - You can take continuous 8 hours for spacecraft operation every day.
  - The lifetime is a free parameter. But you should consider the effect of radiation for the proposed lifetime.
  - The proposed launch date should be before 2030.

# Launcher delivery

The launcher shall deliver the spacecraft into cis-lunar orbit or deep space trajectory orbit with the relative velocity to the Earth (excess velocity) greater than 0 km/s, and the relation between C3 (square of the excess velocity) and the deliverable spacecraft mass as shown in Figure 1.

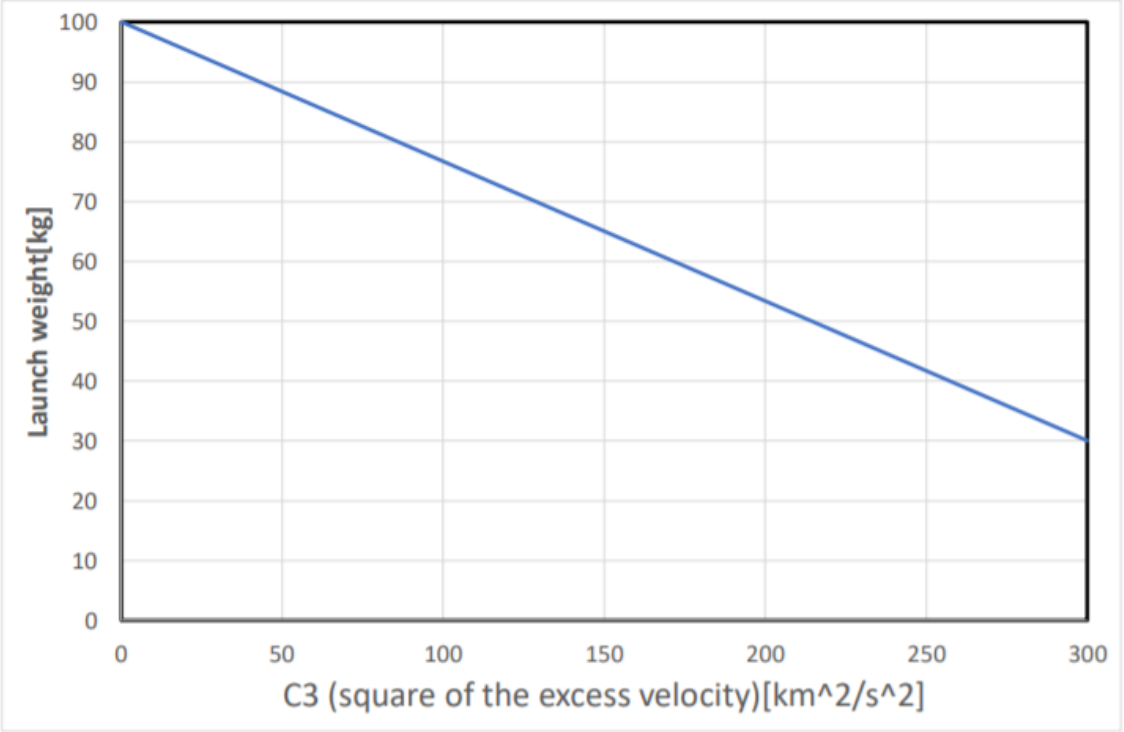


Figure 1 C3 vs. Launch Weight (TBD)

# Communication System

PROCYO's communication system includes:

- XTRP (transponder)
- XSSPA (power amplifier)

Total required power and output RF power of the communication system is roughly 50 W and 15W respectively.

Assume you can use earth ground stations for deep space missions like DSN (Deep Space Network)

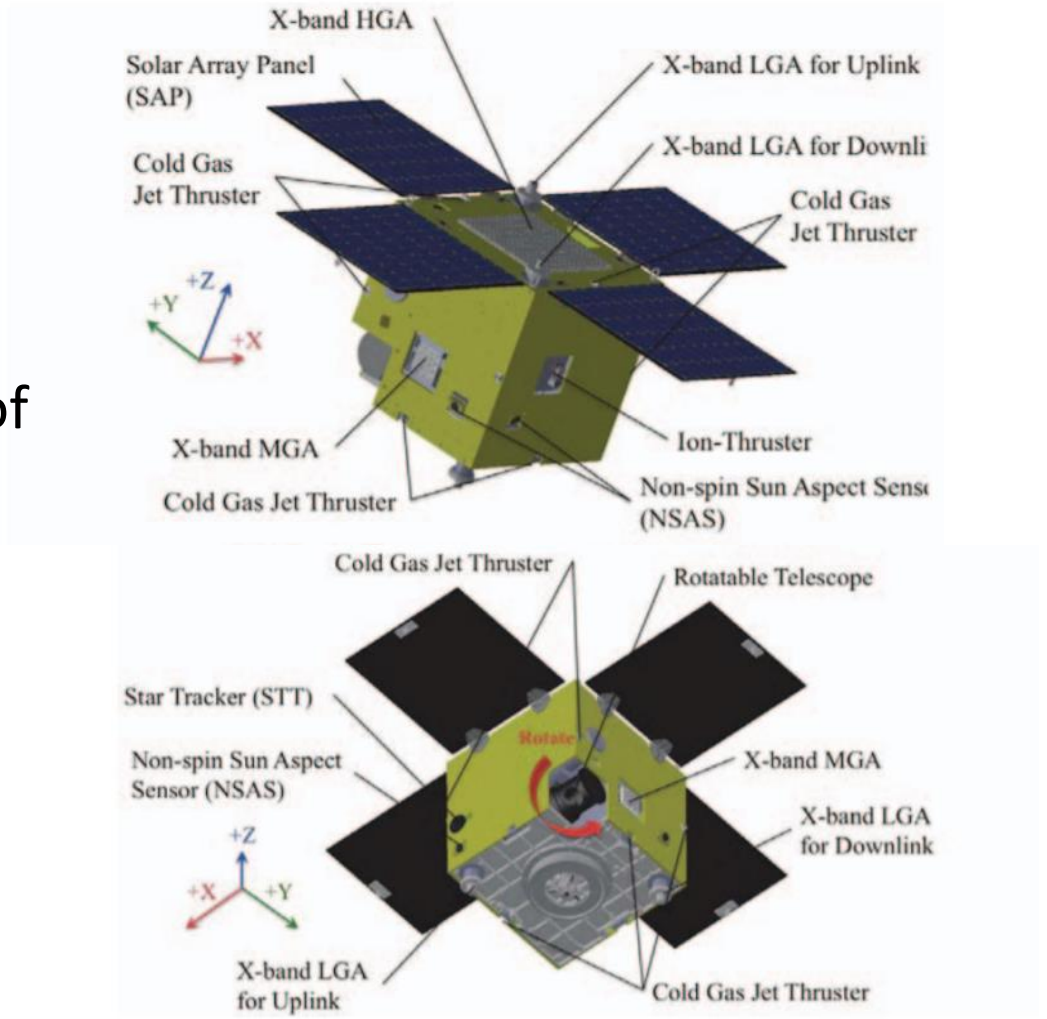


Image source: Kobayashi, Y., Tomiki, A., et al., "Low-cost and ultimately-downsized X-band deepspace telecommunication system for PROCYON mission", IEEE Aerospace Conference, MT, USA, 2016. DOI: 10.1109/AERO.2016.7500745 https://ieeexplore.ieee.org/document/7500745

# Evaluation Criteria

| | |
|---|---|
| **Originality** | Novel concept not yet realized or proposed, or a new implementation of an existing capability or service (25). |
| **Impact** | Impact on society / Potential to expand scientific knowledge / Strengthen deep space mission motivation (25). |
| **Engineering** | Technical description and solutions (20).<br><br>Operational (protocol, communication and interaction during experiment) (15). |
| **Feasibility** | Programmatic (realistic- cost, development schedule, infrastructure requirements) (15). |

Note: Inclusion of a budget and a development schedule is not required for MIC7, however, your proposal should be demonstrably financially and temporally feasible.

# Process and Timeline

## 7/7→8/18→9/30→11/20

**Application Submission : Deadline July 7, 2021**

Submitted abstracts will be evaluated by review team

**Notification of Finalist: August 18, 2021**

Title of paper and finalist(s)' name and affiliation will be published on the website.

**Final Paper Submission: September 30, 2021**

Submitted final paper will be distributed to review team for evaluation

**Presentation in Japan on Nov xx, 2021 (TBD)**

**at the 8th UNISEC-Global Meeting (in-person or online TBD)**

# Lecture series (Feb 15, 18, 25, March 1,4)

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# Reasons for joining MIC

1) Capacity building via training opportunities.
2) Seek meaningful mission ideas.
3) Attend free lectures on deep space exploration.
4) Make a difference in the real-world. MIC can function as catalyst and result in projects which are innovative, affordable and technically reachable.
5) Receive exposure for your ideas. Develop your career profile and find potential future collaborators among a worldwide network.
6) Recognition of excellence; awards/prizes (TBA).

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# JOIN US!

Join Lecture series: http://www.spacemic.net/lecture.html

Register at: https://tinyurl.com/MIC7-LS

Download the abstract template: http://www.spacemic.net/

Submit your abstract!

**Application Submission : Deadline July 7, 2021**

**Note: Registration to compete in MIC7 will open soon. You can begin working on your abstract now.**



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