

IAF MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM (A2)
Science Results from Ground Based Research (4)

Author: Mr. Ruben Sanchez
Concordia University, Canada, ruben.e.sanchez.a@gmail.com

Mr. Jonathan Bissonnette
Concordia University, Canada, jonathanbissonnette1@gmail.com

Ms. jiaxuan zhao
Concordia University, Canada, jiaxuan.zhao10@gmail.com

Mr. Jacob Daigle
Concordia University, Canada, daiglejacob@me.com

LEO MICROFLUIDICS EXPERIMENT MODULE

Abstract

The goal of the project is to design and build a controlled environment small enough to fit within a 1U (10 cm X 10 cm X 10 cm) Cubesat and capable of withstanding the harsh environment of space. This micro-habitat is designed to facilitate yeast experiments on a microfluidic card, providing vital insights into fungal behavior under space conditions. Our system ensures precise temperature regulation and real-time monitoring, offering detailed data on environmental conditions and experimental statuses, including automated experiment activation.

By leading the design and development of this innovative capsule, our team aims to contribute significantly to the field of astrobiology, offering new insights into how life forms, particularly fungi, can adapt to and thrive in space.

The creation of our prototype not only showcases the feasibility of such miniaturized life-support systems in space but also sets the groundwork for future advancements in environmental science, medicine, agriculture, and the broader field of space exploration. Understanding fungal behavior in microgravity and radiation-rich environments, as facilitated by our capsule, opens new avenues for biotechnological applications and supports the development of sustainable life support systems for long-duration space missions and eventual planetary colonization.

Scheduled for a space mission in 2026 to gain flight heritage, our project represents a pioneering effort in making space research more accessible and collaborative. Our commitment to open-source principles in the design and development of this capsule underlines a shift towards more inclusive and shared scientific endeavors. We believe that by providing open access to our research and findings, we can inspire innovation and foster a community of contributors, accelerating the pace of discovery and the application of knowledge in space science and beyond.