

Can we establish artificial gravity for future space stations?

Johanna Chevalier and Enzo Allain

Abstract

As time goes by and with scientific progress, manned space missions are planned and reach horizons much farther than our good old Moon. These missions are meant for future astronauts to stay aboard a space station for several months, even several years. Yet, as we know, living in space is not without consequences for the body and can be, without the practice of very regular physical activity, very dangerous for an individual's health and survival.

Thus, astronauts are subjected to a very intensive exercise program, but it is difficult to carry out in the absence of gravity. That is why we imagine, much like the spacecraft depicted in 2001: A Space Odyssey or even in Interstellar, a method to create artificial gravity and make it easier for astronauts to exercise and move around.

To create artificial gravity, one solution can be considered: rotating a structure so that the centrifugal acceleration holds the passengers on the floor. This method, drawn primarily from fiction, is nonetheless very difficult to implement and many factors must be taken into account, such as: the Coriolis forces, an astronomical energy cost, and substantial material requirements.

Johanna Chevalier

Student

+336045701

johannachevalier5@gmail.com



Education

Second and Third year of CPES, 2023-2025 Physics-Chemistry Pathways

Multidisciplinary Undergraduate Program in Science, Environment and Society

Second-year project: Research project and writing of a scientific article

Third-year project: Research internship abroad
Université de Rennes, Lycée Chateaubriand,
ENS Rennes - Rennes

First year of CPGE PCSI, 2022-2023

Intensive two-years program preparing for French
Grandes Écoles entrance exams focus on Maths, Physics,
Chemistry and Engineer Science
Lycée Chateaubriand - Rennes

Graduate of the baccalaureate with highest honors, Academic Year 2021-2022

Physics-Chemistry and Mathematics
Specializations

Lycée Marguerite de Navarre - Alençon

Skills

- Powerpoint
- Excel/Spreadsheet
- Python
- Word/ Libre Office
- Regressi
- "Pix Certification", 2022 & 2024 (Assesses proficiency in basic IT tools and digital skills)

Languages

- French (mother tongue)
- English B2
- Spanish A2

Work Experience

Upcoming Research Internship (8 weeks), Leiden (Netherlands), May - July 2025

Topic : Photochemistry and spectroscopy of interstellar
fullerene, PAHs and large organic compounds : search and
analysis of VLT UVES spectra from EDIBLES programme

Salesperson in Bakery "Louise", Condé-Sur-Sarthe, 1 month in 2022 and 3 weeks in 2024

Tasks completed :

- Ensuring the cleanliness of the bakery to welcome customers in an optimal environment throughout the day and before closing.
- Ensuring that customer demands are satisfied by managing the sales of products and their shelf stocking.

Observation internship at the Veterinary Clinic of Moulin à Vent - Condé Sur Sarthe (1 week), 2019

Tasks completed :

- Administering dressings and injections
- Cages cleaning and classification of products
- Providing assistance by observing surgery and getting to know analytical machines

Additional Information

Hobbies

- Books and musics
- Astronomy
- Tennis
- Chess
- Travelling, hiking