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Fram2 Selects 22 Science and Research Experiments to Further Long-Duration Space Exploration

KENNEDY SPACE CENTER, Fla., (March 24, 2025) – Fram2, the first human spaceflight over the Earth's polar regions, announces today the extensive suite of science and research experiments the crew and SpaceX will conduct throughout the nearly four-day mission. The selected projects, sourced by SpaceX, will help advance humanity's capabilities for long-duration space exploration and understanding human health in space. Throughout Fram2's time on-orbit, the crew are planning to take the first x-ray in space, perform exercise studies to maintain muscle and skeletal mass, and grow mushrooms in microgravity. Additionally, after safely returning to Earth, the crew plans to exit from the Dragon spacecraft without additional medical and operational assistance, helping researchers characterize the ability of astronauts to perform unassisted functional tasks after short and long durations in space.

"With the same pioneering spirit as early polar explorers, we aim to bring back new data and knowledge to advance the long-term goals of space exploration," said Chun Wang, mission commander. "Much like Fridtjof Nansen, who led a groundbreaking logistical operation during his historic Fram expedition in the 1800s, the science and research projects onboard will inform how we prepare for future missions, ultimately helping make space more accessible to us all."

SpaceX is targeting no earlier than Monday, March 31, 2025 for Falcon 9 to launch the Fram2 crew aboard Dragon to a 90-degree circularized orbit, allowing the crew to fly over and explore the Earth's polar regions from low-Earth orbit for the first time. During the mission, the crew will conduct 22 research projects including:

- The SpaceXray study will elevate medical capabilities to new heights by taking the first X-rays of humans in space. When SpaceXray's international team breaks this imaging barrier, it will open the door to a vast array of clinical, research, and engineering applications.
- The Egress study will help to characterize the ability of astronauts to perform unassisted functional tasks related to getting the landing vehicle in a safe configuration and exiting the lander after both short and long durations in space.
- The Blood Flow Restriction (BFR) study plans to demonstrate BFR during exercise in Dragon with a passive (Hytro) and active system (Delfi), and if found to be effective, would better enable astronauts to maintain muscle and bone health throughout long flights to and from Mars. This will be the first time exercise has taken place on Dragon.
- Mission MushVroom will be the first study to grow mushrooms in space. Oyster mushrooms are the perfect space crop, helping astronauts meet their nutritional needs on long-duration space missions like those to Mars, while closing the loop in plant agriculture and helping to minimize inputs and waste.
- For decades, astronauts have faced significant sleep disruptions during their missions. Using the Oura Ring, in collaboration with Oura Health, Inc. this study seeks to deeply investigate the alterations in sleep quality and stress levels among astronauts throughout their journey to space. By meticulously tracking astronauts' sleep patterns before, during, and after their spaceflight, this study marks a pivotal first step in conducting a longitudinal analysis of the profound effects of space travel on the human body, providing critical insights into how astronauts can successfully readjust to Earth-like conditions after their travel beyond our planet.

- Spaceflight impacts many aspects of human anatomy, particularly the brain. For over a decade, astronauts have undergone imaging to track these changes both before and after their journeys. Yet, a critical concern remains: the delay between an astronaut's return to Earth and their imaging session, which can confound results. This study seeks to eliminate that delay by employing the novel mobile Hyperfine MRI device. By imaging astronauts immediately upon their return, we aim to capture precise measurements that reveal how spaceflight alters brain anatomy more effectively than ever before.
- One of SpaceX's driving goals is to make space accessible to a broader swath of the population. More than 10% of the world population is diabetic. With a better understanding of glucose regulation in space and the accuracy of glucose monitoring tools, SpaceX will gain confidence in providing high-quality care to diabetic astronauts. The fluid shifts that occur in space may affect the accuracy of continuous glucose monitors, thus this study aims to validate a continuous glucose monitor over the duration of the Fram2 mission, as well as monitoring changes in glucose regulation due to exposure to microgravity.
- A women's health study will utilize the novel Hormona test and app to analyze how the female reproductive hormones are impacted by microgravity and space radiation.
- Space THAL explores how spaceflight and microgravity affect blood health, specifically focusing on anemia, a critical challenge for long-term missions like those to Mars.
- A study on motion sickness aims to quantify the severity and time course of motion sickness in astronauts, using a standardized stimulus, during and following gravity transitions into space and returning to Earth.
- A study on bone health will use advanced imaging to monitor direct changes to the microstructure that underpins bone loss. Integrating knowledge from short, medium and long-duration space flight missions will help understand how a mission to Mars might impact the human skeleton.

About Fram2

Fram2 is the first polar-orbit human spaceflight mission designed to fly over the Earth's polar regions. It is named after the Fram ship, which was built in the 1800s and helped explorers first reach the Earth's polar regions. Fram is Norwegian for "Forward" and was the name of the legendary ship designed to function in the icy polar waters used by some of the first crews to explore the Arctic in the late 1800s. The Fram2 crew consists of Mission Commander Chun Wang, Vehicle Commander Jannicke Mikkelsen, Mission Pilot Rabea Rogge, and Mission Specialist and Medical Officer Eric Philips. Each crewmember has significant experience exploring and capturing the polar regions and brings a unique expertise and perspective to support Fram2.

Fram2 has two main goals: to be the first crew to view and capture the Earth's polar regions from low-Earth orbit and conduct research to help advance humanity's capabilities for long-duration space exploration. The nearly four-day mission will take place on SpaceX's Dragon spacecraft launched atop a Falcon 9 rocket no earlier than March 31, 2025. Follow the mission on social media via X (@framonauts) and visit F2.com for updates.

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