

# CAPSTONE, NASA's new satellite

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**In news**— NASA has launched CAPSTONE- *Cislunar Autonomous Positioning System Technology Operations and Navigation Experiment* that is designed to test a unique, elliptical lunar orbit.

## **About CAPSTONE satellite-**

- It is a microwave oven-sized CubeSat weighing just 55 pounds (25 kg) satellite.
- **The satellite was launched on Rocket Lab's Electron rocket from the Rocket Lab Launch Complex 1.**
- It is heading towards an orbit intended in the future for Gateway, a Moon-orbiting outpost that is part of **NASA's Artemis program.**
- As a pathfinder for Gateway, **CAPSTONE aims to help reduce risk for future spacecraft** by validating innovative navigation technologies, and by verifying the dynamics of the halo-shaped orbit.
- **The orbit is known as a near-rectilinear halo orbit (NRHO).** It is significantly elongated, and is located at a precise balance point in the gravities of Earth and the Moon. This offers stability for long-term missions like Gateway.
- **At the Moon, CAPSTONE will enter NRHO, where it will fly within 1,600 km of the Moon's North Pole** on its near pass and 70,000 km from the South Pole at its farthest.
- The spacecraft will repeat the cycle every six-and-a-half days and maintain this orbit for at least six months to study dynamics.
- **CAPSTONE will gain experience with small dedicated launches of CubeSats** beyond low-Earth orbit, to the Moon, and beyond.
- The spacecraft is currently in low-Earth orbit and is

attached to Rocket Lab's Lunar Photon.

### **NASA's Artemis program-**

- The Artemis program is **a human spaceflight program led by NASA to explore the Moon**, aiming for its first touchdown on the lunar south pole by 2025.
- If successful, the **Artemis program will perform the first crewed lunar landing mission since Apollo 17 in 1972**, the final lunar flight of the Apollo program.
- The Artemis program **began in December 2017** as part of successive efforts to revitalize the U.S. space program.
- **Short-term goal for the program is landing the first woman and first person of colour on the Moon**; mid-term objectives include establishing an international expedition team, and a sustainable human presence on the Moon.
- **Long-term objectives for Artemis are** laying the foundations for the extraction of lunar resources, and eventually making crewed missions to Mars and beyond feasible.
- The Artemis program is carried out predominantly by NASA and U.S. commercial spaceflight contractors, in partnership with the European Space Agency and the space agencies of several other nations.