Dr. MGR-ACS Space Technology Centre

SPACE EXPLORER

"An Ingress to Borderless world"

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SpaceX launches 114 satellites and nails rocket landing in its landmark 200th flight

Image Credit: SpaceX

A SpaceX Falcon 9 rocket launched into a brilliant blue sky on Jan. 3 from Cape Canaveral Space Force Station in Florida, carrying 114 satellites to orbit — the second-most spacecraft ever lofted on a single mission.

The flight, called Transporter-6, is notable for another reason as well: It marked the 15th mission for this particular Falcon 9's first stage, tying a reusability record that SpaceX set just last month. It was also SpaceX's 200th flight and the company's 161st successful rocket landing.

The Falcon 9 lifted off on Jan. 3 at 9:56 a.m. EST (14:56 GMT), kicking off Transporter-6, SpaceX's sixth dedicated small-satellite rideshare mission. The 114 payloads on the flight include "cubesats, microsats, picosats and orbital transfer vehicles carrying spacecraft to be deployed at a later time," SpaceX wrote in a mission description.

Three dozen of those cubesats are "SuperDoves" Earth-observing satellites the size of a loaf of bread built and operated by the San Francisco-based company Planet.

Among the many satellites flying on Transporter -6 are six craft that will be operated by Virginia-based space analytics company Spire Global, as well as EOS SAT-1, the first spacecraft in a seven-satellite, agriculture focused constellation planned by EOS Data Analytics (EOSDA).

The EOSDA network — which will be fully up and running by 2025, if all goes according to plan — will study farmlands and forests around the world. Its data will help customers monitor crop growth and health and implement sustainable practices, among other applications, company representatives said.

SpaceX has used the Falcon 9 first stage on this mission for a variety of different flights. It launched 10 different Starlink internet satellite missions, as well the company's Transporter -2 rideshare mission and there other commercial satellite flights.

Virgin Orbit rocket suffers anomaly during 1st launch from UK

Image Credit: Virgin Orbit

the "Start Me Up" mission by Virgin Orbit, started out well enough. The company's carrier plane, known as Cosmic Girl, lifted off from Spaceport Cornwall here on schedule Monday (Jan. 9) at 5:02 p.m. EST (22:02 GMT).

Cosmic Girl dropped Virgin Orbit's 70-foot-long (21 meters) LauncherOne rocket at 6:09 p.m. EST (2309 GMT), while the plane was off Ireland's southwest coast. The rocket's first stage did its job, and LauncherOne's two stages separated as planned about 3.5 minutes after the drop.

The rocket's upper stage finished a nearly five-minute burn shortly thereafter, then went into a long coast. It was during this phase that we learned something had gone wrong.

"It appears that LauncherOne has suffered an anomaly, which will prevent us from making orbit this mission," Virgin Orbit's Chris Relf, director of systems engineering and verification, said during a webcast of the mission. Details were not immediately available.

The failure resulted in the loss of nine satellites. Those payloads are an in-orbit manufacturing experiment by the U.K. company Space Forge; several U.K. defense cubesats, including two for studying the ionosphere, the upper layer of Earth's atmosphere where space weather occurs; and an experimental global navigation satellite co-funded by the European Space Agency.

"Start Me Up," which took its name from the famous 1981 song by the Rolling Stones, was an important mission for Virgin Orbit. All five of the company's previous orbital flights originated from the Mojave Air and Space Port in southeastern California, so "Start Me Up" opened a new launch chapter for the company.

At a pre-launch press conference on Sunday (Jan. 8), Virgin Orbit CEO Dan Hart said the company may be back at Spaceport Cornwall later this year and is also eyeing other locations all over the world.

"We're excited about the future and coming back, maybe as soon as later this year, to launch again and hopefully get a rhythm going," Hart said. "We want to be a part of the fabric of the space community here in the U.K. as well as globally. That's our objective as a company."

Virgin Orbit had been riding a streak of four consecutive launch successes until today. Those four missions had placed 33 satellites into orbit for a variety of customers.

SpaceX launches 40 OneWeb internet satellites

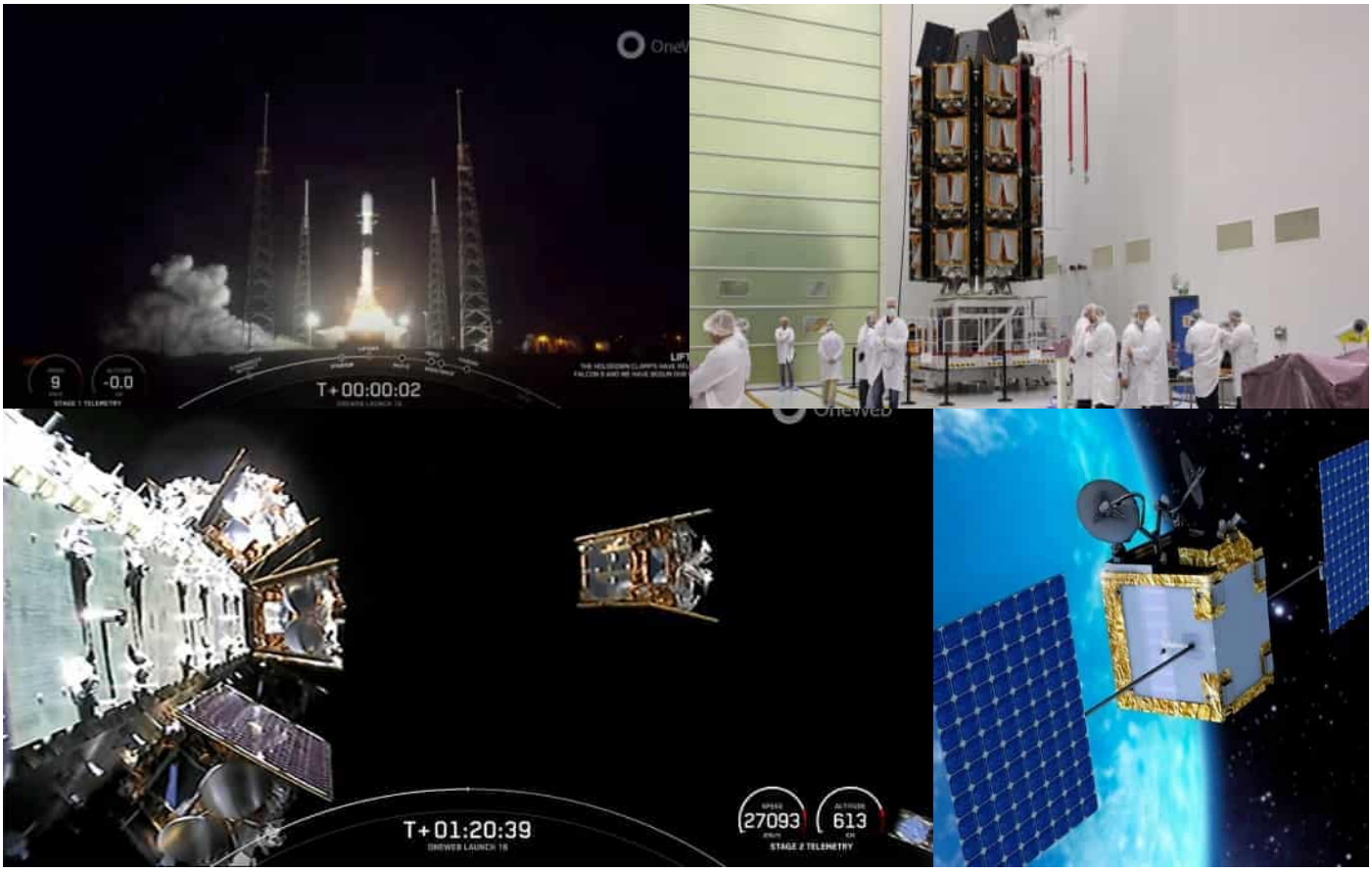

Image Credit: OneWeb and SpaceX

A Falcon 9 rocket topped with 40 of OneWeb's broadband satellites lifted off from Cape Canaveral Space Force Station in Florida as planned on Jan 9 at 11:50 p.m. EST (0450 GMT).

The Falcon 9's first stage came back to Earth for a touchdown at Cape Canaveral's Landing Zone 1 about seven minutes and 45 seconds after launch. It was the second landing for this particular booster, which also launched SpaceX's robotic CRS-26 cargo mission to the International Space Station for NASA on Nov. 26 of last year.

The Falcon 9's upper stage, meanwhile, continued carrying the 40 OneWeb satellites to low Earth orbit. The spacecraft were deployed as planned over a roughly 37-minute span starting about 58 minutes after liftoff.

OneWeb is assembling a network of 648 satellites that will provide internet service to customers around the world. Before Monday night's mission, the London-based company had lofted 502 of those spacecraft, mostly aboard Russian-built Soyuz rockets operated by French outfit Arianespace.

But Russia's invasion of Ukraine in February 2022 put an end to the Russian partnership with Arianespace, forcing OneWeb to find other rocket rides. OneWeb did so, quickly signing launch deals with SpaceX and NewSpace India Limited (NSIL), the Indian Space Research Organisation's commercial arm.

OneWeb has now flown twice with SpaceX and once with NSIL; 36 of its satellites went up on an Indian Launch Vehicle Mark-3 this past October, and a Falcon 9 lofted another 40 last month.

NASA opens hatch of Artemis 1 Orion spacecraft

Image Credit: *NASA*

NASA has started unpacking the Orion spacecraft after its epic moon mission.

Technicians at NASA's Kennedy Space Center (KSC) in Florida have opened Orion's hatch and begun removing payloads that flew to the moon and back aboard the capsule on the Artemis 1 mission. This work will take quite a bit of time.

"This week, technicians will extract nine avionics boxes from the Orion, which will subsequently be refurbished for Artemis 2, the first mission with astronauts," NASA officials wrote in an update on Tuesday (Jan. 10).

"In the coming months, technicians will remove hazardous commodities that remain on board. Once complete, the spacecraft will journey to NASA Glenn's Neil A. Armstrong Test Facility [in Ohio] for abort-level acoustic vibration and other environmental testing," they added.

Artemis 1 launched on Nov. 16 from KSC atop a Space Launch System rocket, sending the uncrewed Orion on a shakeout cruise to lunar orbit. The mission, the first of NASA's Artemis program of moon exploration, wrapped up when Orion splashed down off the coast of Baja California on Dec. 11.

The capsule then traveled by truck across the country, arriving back at KSC on Dec. 30. Ever since, workers have been inspecting Orion and its various systems, assessing how they performed during the nearly 26-day Artemis 1 mission.

The capsule's 16.5-foot-wide (5 meters) heat shield — the largest of its type ever flown — is receiving particular attention, given the extreme conditions it experienced. During Orion's reentry through Earth's atmosphere on Dec. 11, the heat shield endured temperatures up to 5,000 degrees Fahrenheit (2,800 degrees Celsius), about half as hot as the surface of the sun.

These ongoing inspections will inform preparations for the Artemis 2 mission, which is scheduled to launch astronauts around the moon in 2024.

If all goes well with that flight, NASA can start gearing up for Artemis 3, which will land crewmembers near the moon's south pole, where the agency plans to build a research outpost by the end of the decade. Artemis 3 is targeted to lift off in 2025 or 2026.

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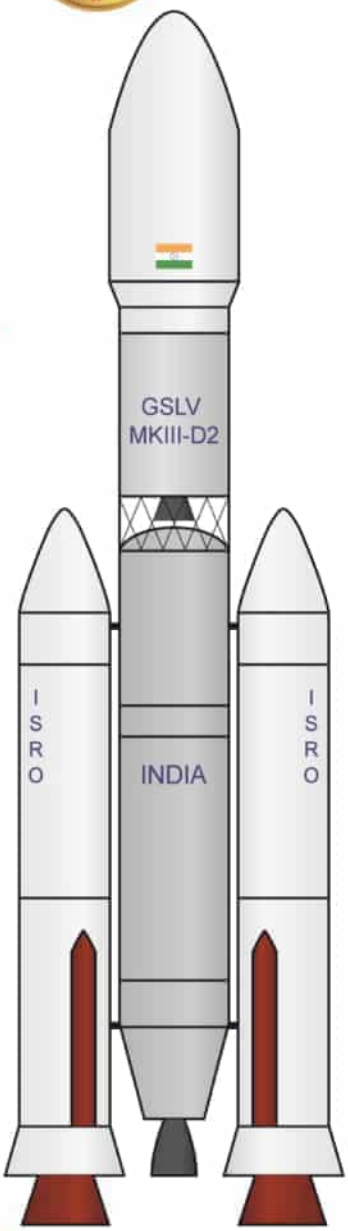

National Seminar

SPACE – 2.0

An Era of Small Satellites
Big Applications-
Opportunities and Challenges

Venue: Ramanujan Auditorium

Day 30 - 31 Month Jan Year 2023

For Registration

Last Date for Registration
13 Jan 23

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Ms. Rei Kawashima, Secretary General, University Space Engineering Consortium (UNISEC), Japan

Key Areas of Seminar

- Present Position of Space ecosystem in India.
- Strategy for growth of Indian Space Sector.
- Scope for Start -ups in Space Technology.
- Space Material Processing.
- Space Solar Power.
- Small Satellites development.
- Satellite constellation management.
- Deep-Space communication.
- Space Stations and Orbital vehicles .
- Autonomous Space craft.
- Challenges posed by large constellations to sustainability of outer space remedies.
- Conjunction assessment and inter operator coordination
- Future Challenges for Ground and space-based observational systems.

Dr. M.G.R. EDUCATIONAL AND RESEARCH INSTITUTE

Dr.MGR Educational and Research Institute has been founded by our beloved Founder-Chancellor Dr.A.C. Shanmugam, with the vision and mission of creating a holistic environment of academic excellence through the process of knowledge creation, knowledge delivery and. knowledge application that are harmonious with institutional, industrial and social needs and requirements. The noble mission is on the success path under the patronage of Er. A.C.S. Arun Kumar, the President of the University. The University has 14 Faculties, 74 Departments, 1453 Staffs & 26434 Students, offers a wide range of undergraduate, graduate and doctoral programs in Medicine, Dentistry, Engineering, Architecture, Law, Management, Mass media, Mass communication, Computer Science, Applied Sciences and Pharmacy.

Dr. MGR-ACS SPACE TECHNOLOGY CENTRE

Dr. MGR-ACS Space Technology Centre under the aegis of Dr.MGR ERI was established to widen the knowledge horizon of young aspirants in the realm of space. The academic wings over the sovereignty of space program was initiated by taking part in the ambitious mission of 75 Student's Satellites Mission-2022, themed to build satellites by Indian students, Our satellite payload is intended to assist the fishermen's life by intimating while they cross the border. The launch is scheduled by ISRO around February 2023. The centre also archived it's societal accountability by launching it's Space Magazine, named "Space Explorer" -Bimonthly Issue to disseminate the compendium of Space facts and current affairs in the Satillite Development. Students at the centre are trained and motivated to become future scientists in the field of space technology. The Centre also Proposed to offer an Elective Course & PG course in Space Technology.

Speakers:

- Padma Shri **Prof. R.M. Vasagam**, Former VC (Anna University) and Dr.MGR University
- Padma Shri **Dr. Mylswamy Annadurai**, Former Director, ISRO
- **Dr. Prakasha Rao PJVKS**, Former Director, Space Infrastructure Program Development
- **Shri. A. Rajarajan** Distinguished Scientist, Director, SHAR
- **Prof. Venkata Prasad**, TU Delft University, Netherlands
- **Dr. Jayakumar Venkatesan**, Skoltech University, Russia
- **Dr. Alejandro Roman**, Director General of Paraguay Space Agency
- **Prof. Dušan Radosavljević**, Founder and Head, Committee for Space Programme and Development (CSPD), Serbia
- **Ms. Rei Kawashima**, Secretary General, University Space Engineering Consortium (UNISEC), Japan

Keynote Address on Theme:

- **Ms. Pramitha**, Founder CEO, Transcend, Space Startup
- **Dr. J. Ramkumar**, Professor, IIT Kanpur

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Students / Research Scholars - **Rs. 600/-**
Faculty - **Rs. 1200/-**
Industrial Person - **Rs. 2000/-**
Payment details will be informed on **15.01.2023**
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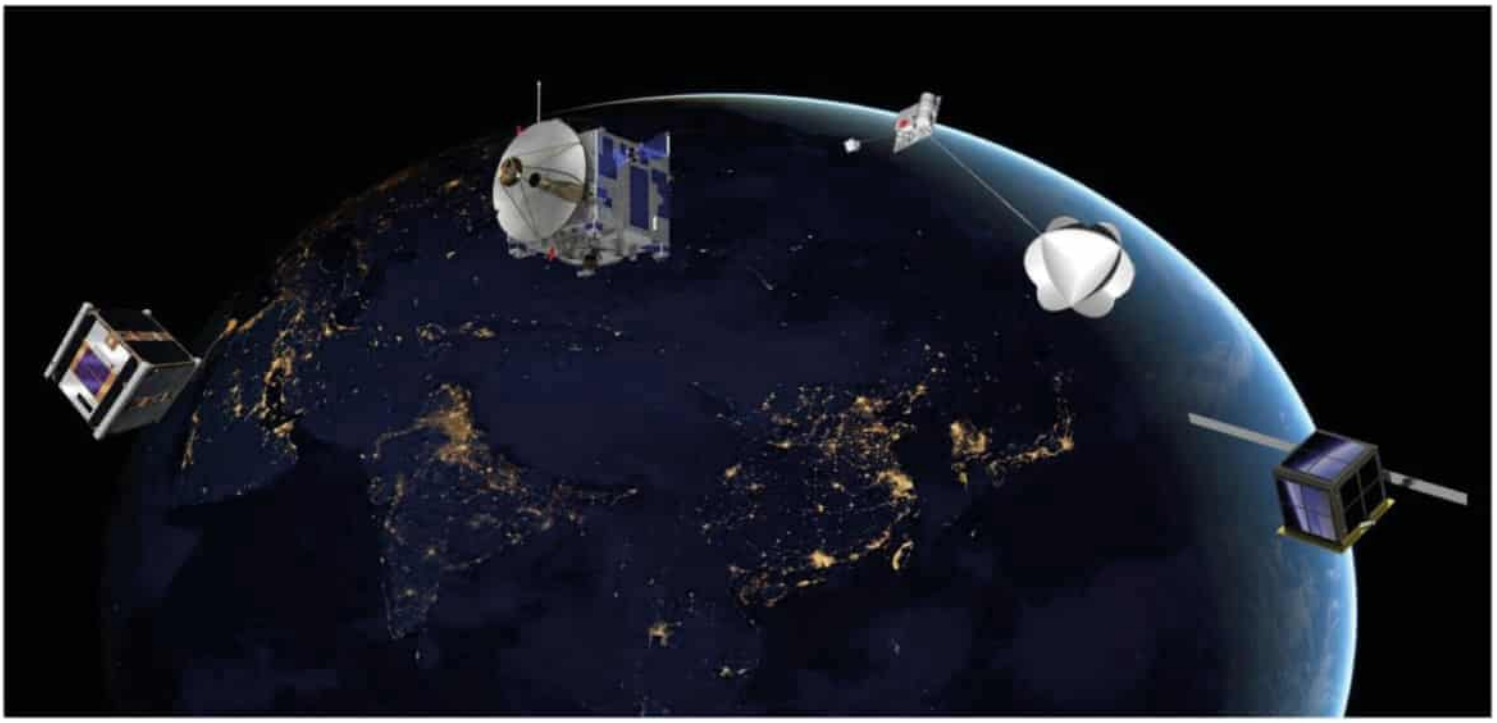
75 Students' Satellites Mission of Dr.MGR University



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SPACE SENSORS

The use of crystal oscillators in space is a critical component of modern space exploration. These tiny devices are the beating heart of all kinds of electronic equipment and systems, from communication satellites to scientific instruments onboard spacecraft.

Crystal oscillators are a type of electronic oscillator that uses the natural resonance of a quartz crystal to generate a precise, stable frequency signal. This signal can be used as a time reference, a clock signal, or a frequency standard, depending on the application.

In space, crystal oscillators play a vital role in ensuring the accuracy and reliability of communication systems. These systems are used to transmit data and commands between spacecraft and Earth, and they rely on precise timing to ensure that the signals are received and decoded correctly.

The accuracy of crystal oscillators is critical in space because the environment can be harsh and unpredictable. Spacecraft are subject to extreme temperatures, radiation, and other factors that can affect the performance of electronic components. Crystal oscillators are designed to withstand these conditions and continue to provide reliable and accurate signals.

Another critical use of crystal oscillators in space is in scientific instruments. Many of the most significant discoveries in space science have been made using instruments that rely on precise timing and frequency measurements. For example, the Hubble Space Telescope uses crystal oscillators to stabilize its pointing and to control the timing of its observations.

Crystal oscillators are also used in navigation systems onboard spacecraft. These systems rely on precise timing signals to calculate the spacecraft's position and velocity. In some cases, multiple crystal oscillators are used in redundant systems to provide backup in case of a failure.

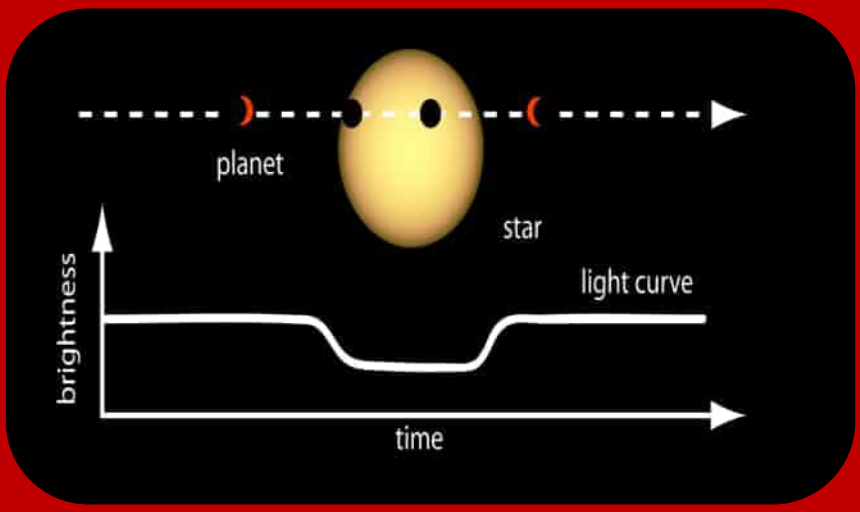
In recent years, advancements in technology have led to the development of new types of crystal oscillators that are even more precise and stable than traditional quartz-based devices. These include temperature-compensated crystal oscillators (TCXOs), oven-controlled crystal oscillators (OCXOs), and atomic clocks.

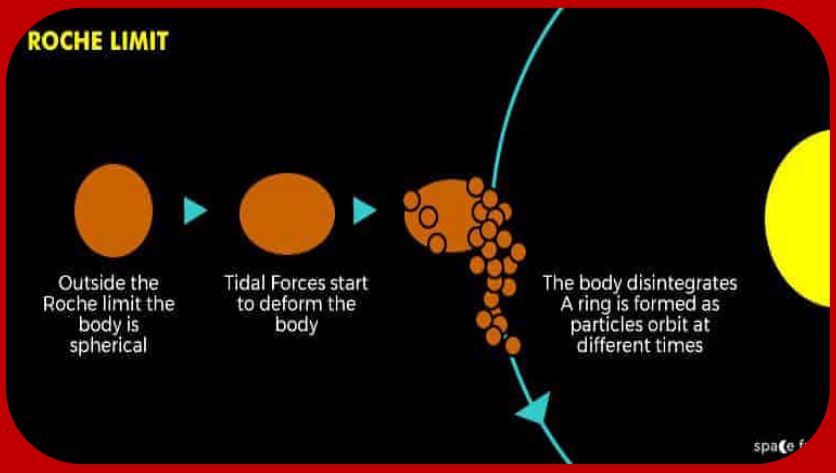
TCXOs and OCXOs are designed to compensate for temperature fluctuations that can affect the frequency stability of crystal oscillators. Atomic clocks, on the other hand, use the natural resonance of atoms to generate a stable frequency signal that is even more precise and stable than quartz-based oscillators. In conclusion, crystal oscillators are an essential component of modern space exploration. These devices provide accurate and reliable timing signals that are critical for communication, scientific instruments, navigation systems, and more. As technology continues to advance, we can expect to see even more precise and stable crystal oscillators used in space missions in the years to come.

Space Terms to know about

Transit :

The phenomenon of a planet passing in front of its star, causing a slight decrease in the star's brightness, which can be used to detect and study exoplanets.



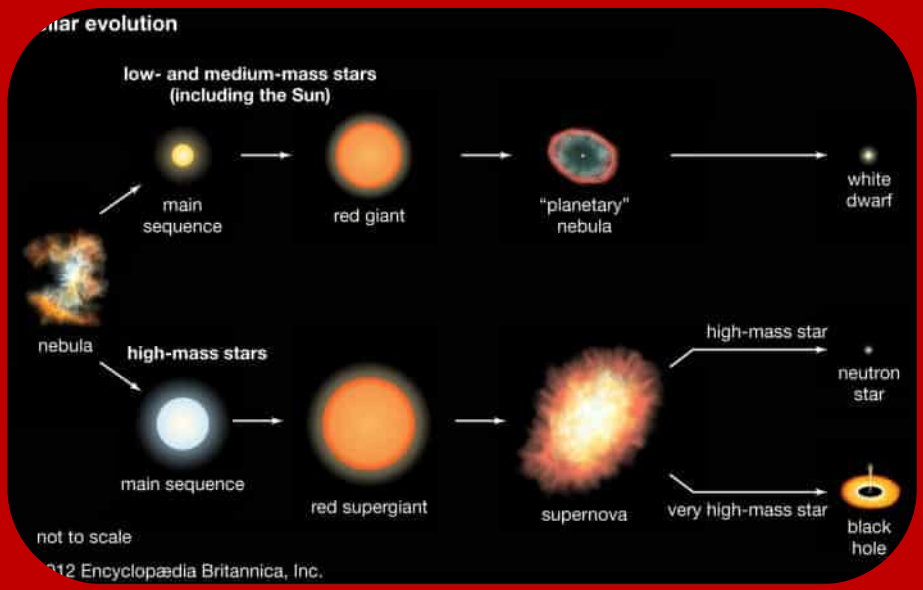


Roche Limit :

The closest distance that a celestial body can approach another object without being torn apart by tidal forces.

Stellar Evolution :

The process by which stars change over time, from their formation through their eventual death or transformation into other types of objects.



Space-Tech Company

Rocket Lab

Image Credit: *Rocket Lab*

Rocket Lab is a private spaceflight company founded in 2006, headquartered in Long Beach, California. They are best known for developing and operating the Electron rocket, which is designed to launch small payloads into orbit. The Electron rocket is powered by electric-pump-fed engines, making it a cost-effective option for companies and organizations that need to launch small satellites. The company has achieved several successful launches, including the deployment of small satellites for commercial customers and scientific research. Rocket Lab's mission is to make space more accessible and affordable for everyone, and they continue to innovate and expand their capabilities in the space industry