Dr. MGR-ACS Space Technology Centre

SPACE EXPLORER

"An Ingress to Borderless world"

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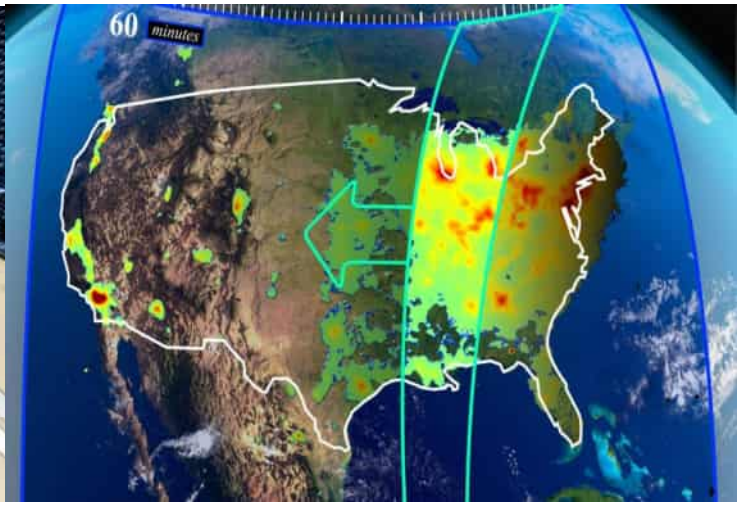
ISRO's Reusable Launch Vehicle aces landing test

The Indian Space Research Organisation (ISRO) on Sunday successfully carried out the landing experiment of the Reusable Launch Vehicle-Technology Demonstration (RLV-TD) programme at the Aeronautical Test Range in Challakere, Chitradurga. An Indian Air Forces (IAF) Chinook helicopter was used to drop the RLV-TD from a 4.5 km altitude and ISRO executed the landing experiment of the RLV-TD as planned. "The RLV took off at 7:10 a.m. by a Chinook helicopter of the IAF as an underslung load and flew at a height of 4.5 km. Once the predetermined pillbox parameters were attained, based on the RLV's Mission Management and Computer command, the RLV has released mid-air, at a down range of 4.6 km," ISRO said. It further added that the release of the RLV was autonomous as it performed approach and landing maneuvers using Integrated Navigation, Guidance, and control system and completed an autonomous landing on the airstrip at 7:40 am.

The space agency also said that in a first in the world, a winged body has been carried to an altitude of 4.5 km by helicopter and released for carrying an autonomous landing on a runway. According to ISRO the configuration of RLV-TD is similar to that of an aircraft and combines the complexity of both launch vehicles and aircraft. "The winged RLV-TD has been configured to act as a flying test bed to evaluate various technologies, namely, hypersonic flight, autonomous landing, and powered cruise flight. In the future, this vehicle will be scaled up to become the first stage of India's reusable two-stage orbital launch vehicle," ISRO said. RLV-TD consists of a fuselage (body), a nose cap, double delta wings, and twin vertical tails. It also features symmetrically placed active control surfaces called Elevons and Rudder. RLV-TD was successfully flight tested on May 23, 2016, from Sriharikota validating the critical technologies such as autonomous navigation, guidance and control, reusable thermal protection system, and re-entry mission management. During this mission the vehicle landed ona hypothetical runway over the Bay of Bengal. Sunday's early morning landing experiment is the second in the series of experimental flights of the programme. One of the key objectives of mastering the RLV technology is to achieve low cost access to space.

SpaceX launches Intelsat satellite with NASA Earth-observation experiment, lands rocket



SpaceX launched a commercial communications satellite into orbit with a NASA Earth science instrument aboard early Friday morning (April 7).

A SpaceX Falcon 9 rocket lifted off from Florida's Cape Canaveral Space Force Station at 12:30 a.m. EDT (0430 GMT), carrying the Intelsat 40e satellite toward geostationary transfer orbit.

The Falcon 9's first stage was making its fourth flight, and it will likely launch again in the future; the booster landed successfully on the company's drone ship A Shortfall Of Gravitas in the Atlantic Ocean just under nine minutes after liftoff.

The rocket's upper stage, meanwhile, deployed Intelsat 40e on schedule, about 32.5 minutes after launch.

Intelsat 40e is an advanced geostationary satellite that will provide high-throughput connectivity to the company's government and enterprise customers across North and Central America.

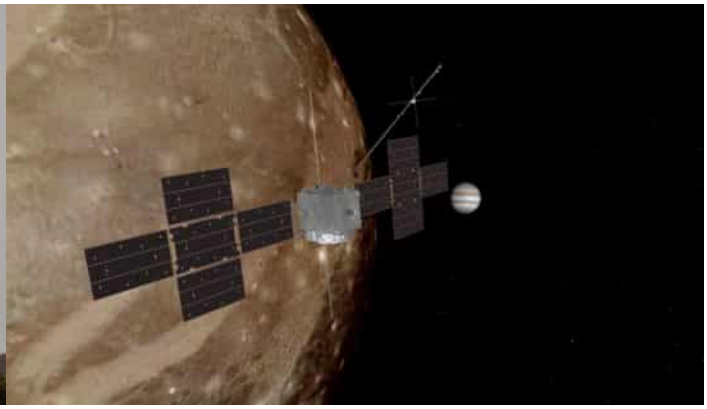
The satellite, developed by Colorado-based Maxar Technologies, also carries NASA’s Tropospheric Emissions Monitoring of Pollution (TEMPO) as a hosted payload.

Intelsat 40e will settle at 91 degrees West in a geostationary orbit (GEO), about 22,000 miles (36,000 kilometers) above Earth's equator. From there, the satellite will perform its main communications role but also allow TEMPO to take hourly snapshots of air pollution over North America. Spacecraft in geostationary orbit effectively appear in a fixed position over Earth, whereas those in low Earth orbits complete around 16 orbits every 24 hours, and may only pass over a certain area once every day. "The total cost to NASA is approximately $210 million," said Kevin Daugherty, TEMPO project manager at NASA's Langley Research Center in Virginia. "Of that, just over $90 million was for the instrument development itself. And the remainder has been for both paying our contractors for hosting TEMPO and then integration, but as well as some support engineering and management that's been going on."

Daugherty added that NASA is working on a "lessons learned session" to look at how best to implement and approach such partnerships with commercial actors in the future.

Friday's launch was SpaceX's 23rd of the year, and the Falcon 9's touchdown was the company's 184th orbital rocket landing overall to date.

Europe successfully launches JUICE mission to study Jupiter's icy moons



The European Space Agency's JUICE space probe successfully launched Friday on a mission to discover whether Jupiter's icy moons are capable of hosting extraterrestrial life in their vast, hidden oceans. The launch on an Ariane 5 rocket from Europe's spaceport in Kourou, French Guiana came after a previous attempt on Thursday was called off due to the risk of lightning. Despite cloudy skies, the rocket took off as planned at 09:14 am local time (1214 GMT) on Friday, as guests including Belgium's King Philippe watched from the Guiana Space Centre. A little under half an hour later, the uncrewed six-tonne spacecraft separated from the rocket at an altitude of 1,500 kilometres (930 miles), which prompted an outbreak of applause at the centre. Stephane Israel, the CEO of French firm Arianespace in charge of the rocket, said the launch was "a success". After a few tense minutes, ground control were relieved to receive the first signal from spacecraft. The spacecraft then began unfurling its array of solar panels, which are a record 85 square metres, the size of a basketball court. It will need all the energy it can get near Jupiter, where sunlight is 25 times weaker than on Earth. Carole Larigauderie, JUICE project head at France's space agency CNES, said the launch the beginning of a long journey which will "not be at all calm". The Jupiter Icy Moons Explorer (JUICE) will take a long and winding path to the gas giant, which is 628 million kilometres (390 million miles) from Earth. Carole Larigauderie, JUICE project head at France's space agency CNES, said the launch the beginning of a long journey which will "not be at all calm". The Jupiter Icy Moons Explorer (JUICE) will take a long and winding path to the gas giant, which is 628 million kilometres (390 million miles) from Earth. It will use several gravitational boosts along the way, first by doing a fly-by of Earth and the Moon, then by slingshotting around Venus in 2025 before swinging past Earth again in 2029. When the probe finally enters Jupiter's orbit in July 2031, its 10 scientific instruments will analyse the Solar System's largest planet as well as its three icy moons Europa, Ganymede and Callisto. The moons were first discovered by astronomer Galileo Galilei more than 400 years ago, but were long ignored as potential candidates for hosting life. However, the discovery of huge oceans of liquid water -- the main ingredient for life as we know it -- kilometres beneath their icy shells has made Ganymede and Europa prime candidates to potentially host life in our celestial backyard. JUICE will focus on Ganymede, the Solar System's largest moon and the only one that has its own magnetic field, which protects it from radiation. In 2034, JUICE will slide into Ganymede's orbit, the first time a spacecraft will have done so around a moon other than our own. NASA's Europa Clipper mission, which is scheduled to launch in October 2024, will focus on Ganymede's sibling Europa.

SpaceX will try to launch 1st Starship orbital flight on April 17

The date is official, now that a launch license from the FAA has come through. It's official: SpaceX will try to launch the first orbital test mission of its huge Starship vehicle on Monday (April 17). SpaceX has been targeting Monday for the Starship flight for the past week or so. That plan was tentative, however, as the company still needed to secure a launch license from the U.S. Federal Aviation Administration (FAA). It's tentative no longer. At 5:50 p.m. EDT (2150 GMT) on Friday (April 14), the FAA announced the granting of the license, ending a review that lasted more than 500 days. Mere minutes later, SpaceX firmed up its launch plans. "Targeting as soon as Monday, April 17 for the first flight test of a fully integrated Starship and Super Heavy rocket from Starbase in Texas," the company tweeted at 5:57 p.m. EDT (2157 GMT) on Friday. The 150-minute launch window opens Monday at 8 a.m. EDT (1200 GMT; 7 a.m. local Texas time). You can watch the liftoff live here at Space.com when the time comes, courtesy of SpaceX. Starship consists of a giant first-stage booster called Super Heavy and a 165-foot-tall (50 meters) upper-stage spacecraft known as Starship. Both of these vehicles are designed to be fully reusable, and both are powered by SpaceX's next-generation Raptor engine — 33 for Super Heavy and six for Starship. As the above tweet notes, the upcoming test flight will lift off from Starbase, SpaceX's facility in South Texas. It will involve a Super Heavy prototype called Booster 7 and the Ship 24 upper-stage variant. If all goes according to plan, Booster 7 will splash down in the Gulf of Mexico about 20 miles (32 kilometers) off the Texas coast around eight minutes after liftoff. Ship 24, meanwhile, will keep flying, conducting a partial lap of Earth before coming down in the Pacific Ocean near Hawaii. When Booster 7 and Ship 24 lift off, Starship will become the most powerful rocket ever to fly. The vehicle will generate about 16.5 million pounds of thrust at liftoff, according to SpaceX — nearly twice as much as the current record holder, NASA's Space Launch System megarocket.

50 flights on Mars! Ingenuity helicopter's record-setting hop is a giant leap for exploration

NASA's incredible Mars helicopter has now flown 50 times on the Red Planet.

Originally rated for just five Martian sorties, Ingenuity notched its 50th on Thursday (April 13), acing a 146-second flight that took it 59 feet (18 meters) above the Red Planet's surface — higher than it's ever gone before.

The 4-pound (1.8 kilograms) drone continues its epic journey on Mars, serving as a scout for NASA's Perseverance rover mission and testing key tech that could help return samples from the Red Planet in the coming years as part of the ongoing search for life on Mars.

"She has blown out of the water any sort of metric of success," Theodore Tzanetos, Ingenuity team lead at NASA's Jet Propulsion Laboratory (JPL) in Southern California, told Space.com last month.

"It's not just a statement of our reliability design, but it's also a statement about the technicians that can assemble this thing, right?" he said. Tzanetos added that the Ingenuity team "has really done miraculous work" that will help in getting two sample return helicopters flying on Mars a few short years from now.

No rotorcraft had flown on a world beyond Earth before Ingenuity made its first tentative hop on April 19, 2021, just two months after it landed on the floor of Mars' Jezero Crater aboard Perseverance.

Ingenuity hovered 10 feet (3 m) off the ground during a 40-second flight, a milestone hailed by then-NASA science chief Thomas Zurbuchen as "a true extraterrestrial Wright Brothers moment."

Getting Ingenuity off the ground was a milestone in itself, as the Martian atmosphere is quite thin and nobody can directly stick-shift the helicopter from Earth; the time delay between communications and receipt is too long for real-time control. But the flight plan uploaded to Ingenuity went well, and other flights ensued.

"The primary goal is still alive: to be a technology demonstrator," Tzanetos said. But the drone is also now serving as a scout for Perseverance, as the duo explore an ancient river delta on the floor of Mars' Jezero Crater. Moreover, the focus is shifting to refining operations, teamwork and design decisions as NASA works to develop two Martian helicopters for its Red Planet sample-return effort. The dual drones on the sample return mission, which is slated to launch in 2028, will serve as backups for Perseverance if the rover cannot ferry the samples it's currently collecting to a rocket-toting lander on its own; the rover has cached some sample tubes in a "depot" on Jezero's floor, which the little Ingenuity-like choppers could fetch and return to their mothership lander.

Chinese rocket start-up bounces back from 3 straight failures with successful launch

China's iSpace hadn't had a successful launch with its Hyperbola 1 rocket since July 2019.

Chinese commercial launch startup iSpace has completed its second successful flight of its Hyperbola 1 solid rocket.

The fifth Hyperbola 1 rocket lifted off from the Jiuquan Satellite Launch Center in northwest China at 12:00 a.m. EDT (0400 GMT, 12:00 p.m. Beijing time) on Friday (April 7).

The four-stage solid rocket successfully achieved orbit but carried no active payload. The aim of the flight was to verify the overall performance of the vehicle and obtain flight data, according to a company statement.

Beijing-based iSpace became big news as the first privately funded Chinese rocket firm to launch a satellite into orbit back in July 2019 with its first Hyperbola 1 launch. The company, however, went on to suffer three consecutive launch failures with the rocket.

Since then, competitors including China's Galactic Energy, Landspace and Space Pioneer have launched their own solid or larger and more complex liquid propellant rockets, leaving iSpace with work to do to catch up.

The company is also working on its own methane -liquid oxygen rocket, named Hyperbola 2, which will have a reusable first stage. iSpace is reported to be working toward hop tests of the new launcher.

The launch was China's 16th of year, with most being Long March rockets operated by China's main space contractor, CASC. Galactic Energy, Expace (a state-owned spinoff) using its Kuaizhou 1A rocket, and now iSpace have also been active.

CASC is planning more than 60 launches this year, and the total number of Chinese launches planned appears to number more than 80.

Virgin Orbit files for bankruptcy after funding efforts fail

The company has launched 33 satellites to orbit to date, but its most recent mission failed.

Virgin Orbit filed for bankruptcy on Monday (April 3), a move that comes shortly after the satellite launch company failed to secure two financing deals and furloughed most of its staff.

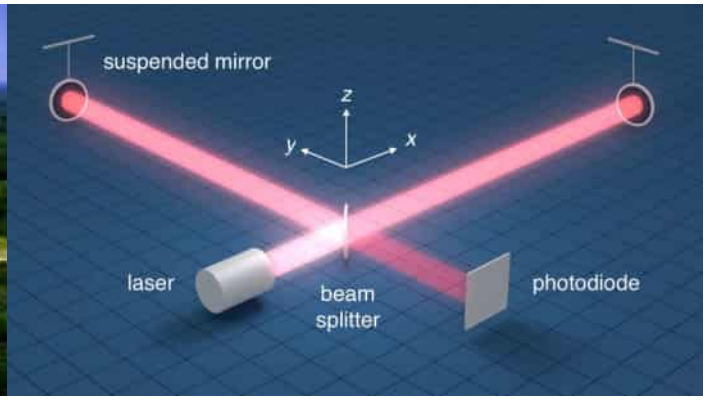
The California-based company has started the process for a Chapter 11 bankruptcy, which is commonly known as "reorganization bankruptcy" and allows the company to continue basic operations while it looks for a buyer. Virgin Investments Limited, which is also part of billionaire Richard Branson's Virgin Group and owns 75% of Virgin Orbit, will provide $31.6 million in support to keep the company afloat until its sale, according to a company statement released on Monday (April 3).

Virgin Orbit, founded in 2017, went public in August 2021 by merging with a special purpose acquisition company (SPAC) named NextGen Acquisition Corp. II. Virgin Orbit raised $228 million from this merger — less than half of the $483 million it had projected. In its most recent quarterly earnings report, issued in November 2022, the launch provider noted that it was operating at a loss of $50.5 million.

Virgin Orbit CEO Dan Hart credited the company for developing a "new and innovative method" to launch satellites into orbit and expressed confidence that the company would get a buyer interested in using the tech to loft satellites in the future. (Virgin Orbit employed an air-launch system, in which a carrier plane hauled a rocket high into the sky and dropped it at altitude.)

"While we have taken great efforts to address our financial position and secure additional financing, we ultimately must do what is best for the business," Hart said. "We believe that the cutting-edge launch technology that this team has created will have wide appeal to buyers as we continue in the process to sell the company."

India will start building new gravitational wave observatory



India will soon break ground on a detector that will hunt for tiny ripples in the fabric of space-time. On April 6, the Indian Cabinet, chaired by Prime Minister Shri Narendra Modi, approved 26 billion rupees ($318 million) to start construction of a new gravitational wave observatory in the western state of Maharashtra. The observatory, which will work in tandem with four similar facilities around the world, is expected to be up and running by 2030. "In a nutshell, it will add to our astronomical capabilities and will enable us to offer inputs and feedback not only to India but to rest of the world," Union Minister Shri Jitendra Singh said at a briefing on April 6, "thereby giving a global role to India through the medium of space technology."

Once ready, India's research facility will join the Laser Interferometer Gravitational-Wave Observatory (LIGO) network of observatories that look for disruptions in the fabric of space-time, which are cosmic signals coming from some of the most violent events in the universe. When massive objects like black holes or neutron stars accelerate, their motion creates "waves of undulating space-time" commonly known as gravitational waves.

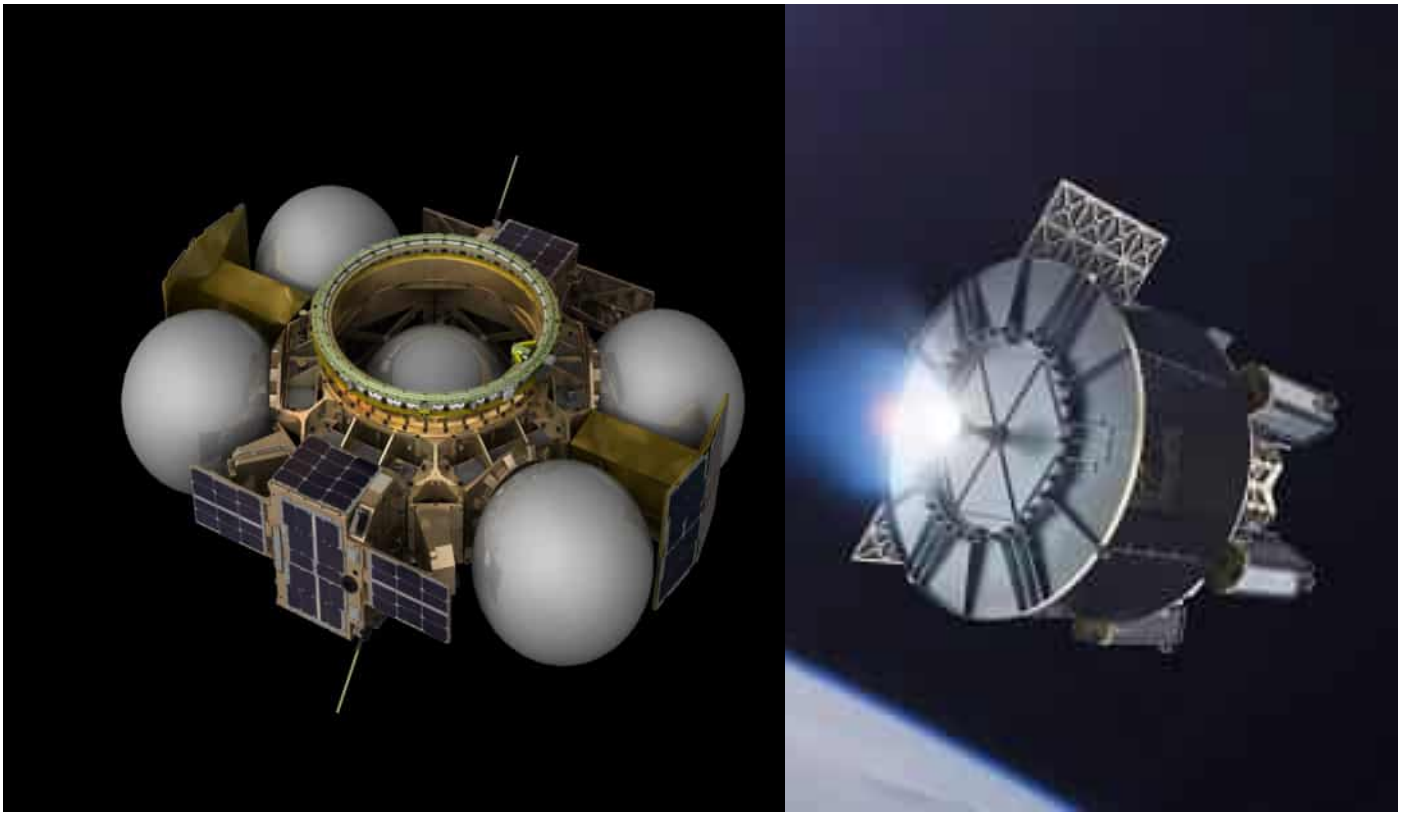
Scientists use LIGO detectors to search for evidence that gravitational waves — which radiate in all directions from their source and squeeze and stretch space-time ever so slightly — have passed by Earth.

For example, back in 2015, LIGO scientists detected, for the first time ever, gravitational waves created by merging black holes. The detection confirmed Albert Einstein's prediction that space and time are not distinct but are instead woven together in a fabric-like structure that curves, stretches and even warps, thanks to the gravity waves created by gigantic objects moving at high speeds, like balls circling each other on a rubber sheet. Scientists have so far detected at least 50 such signals from merging black holes and neutron stars.

Each time a LIGO detector picks up a signal, scientists need to confirm that the candidate signal is really from an event in space like merging black holes and not from the many noise sources on Earth like earthquakes, traffic or even the detector itself. So one of the ways they rule out false positives is by looking for similar signals from four LIGO detectors spread worldwide: Twin facilities in Washington State and Louisiana in the U.S., a third detector called Virgo in Italy and a fourth named Kamioka Gravitational-Wave Detector (KAGRA) in Japan.

With this network of four detectors, scientists say they can nail down the sources that beam out gravitational waves, no matter where in the sky the objects are located. So they are keen to have all four running together. To make sure that happens and also factor in downtimes, "you really need more than four in a network," according to the LIGO team. "LIGO India will be the all-important fifth."

Orbital Transfer Vehicles: The Future of Space Transportation?



Orbital Transfer Vehicles (OTVs) are spacecraft designed to move other spacecraft from one orbit to another. OTVs have several advantages over traditional rockets, including increased maneuverability, the ability to be refueled in space, and a smaller size and lighter weight.

OTVs can be used to move satellites from a low Earth orbit (LEO) to a geosynchronous orbit (GEO), or to move spacecraft from LEO to the moon or Mars. There are several different types of OTVs, including space tugs and space planes. Space tugs are small, uncrewed spacecraft that are used to move other spacecraft, while space planes are reusable spacecraft that are designed to fly like airplanes in the atmosphere and like spacecraft in space.

OTVs have the potential to revolutionize space transportation by making it easier and more efficient to move spacecraft from one orbit to another. In the near future, we may see OTVs being used to transport satellites to new orbits, to service satellites in orbit, and to transport astronauts to the moon and Mars.

Here are some of the benefits of using OTVs:

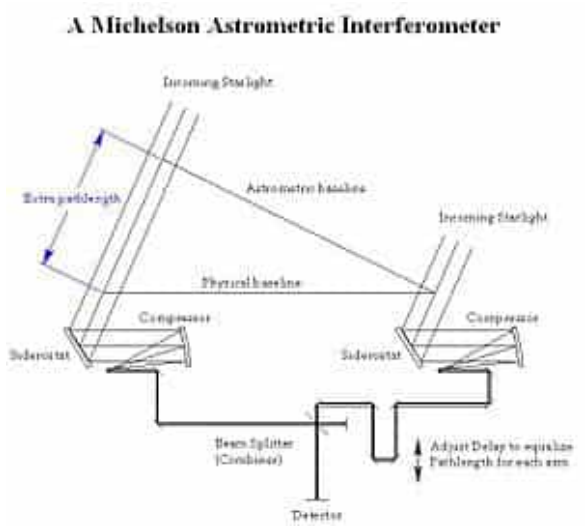
Increased efficiency: OTVs can move spacecraft from one orbit to another more quickly and efficiently than traditional rockets.

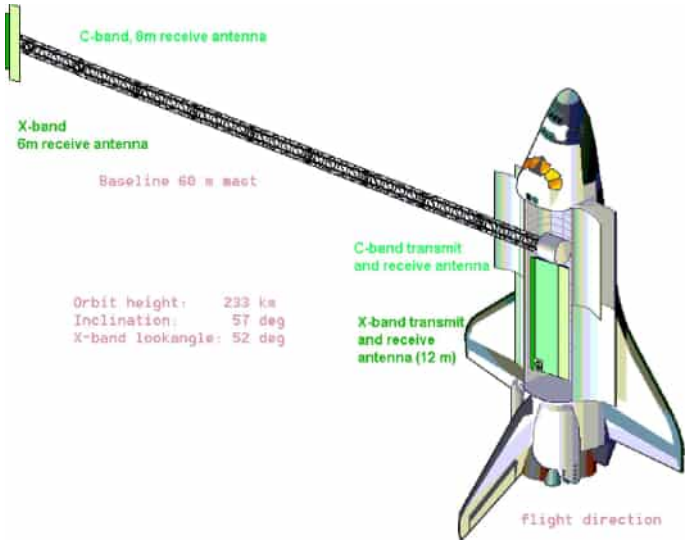
Reduced costs: OTVs can be refueled in space, which means that they can be used for long-duration missions without having to be launched multiple times.

Increased flexibility: OTVs can be used to move spacecraft to a variety of different orbits, which gives space agencies more flexibility in planning missions.

OTVs are still in the early stages of development, but they have the potential to revolutionize space transportation. With OTVs, we can explore space more quickly, affordably, and efficiently than ever before.

SPACE SENSORS





Interferometers are devices that use the interference of waves to measure small distances or changes in distances. They are used in a variety of applications, including astronomy, telecommunications, and medical imaging. In space, interferometers are used to study the universe in a variety of ways. For example, they can be used to map the surface of planets, study the atmosphere of other planets, and detect asteroids and comets. One of the most well-known interferometers used in space is the Very Large Telescope Interferometer (VLTI). The VLTI is a network of four telescopes located in the Atacama Desert in Chile. The telescopes are linked together by optical fibers, and they can be used to create a virtual telescope with a diameter of up to 100 meters. The VLTI has been used to study a variety of objects in space, including the surface of Mars, the atmosphere of Venus, and the rings of Saturn. It has also been used to detect exoplanets, which are planets that orbit stars other than the Sun. Another interferometer used in space is the Laser Interferometer Gravitational-Wave Observatory (LIGO). LIGO is a pair of interferometers located in Hanford, Washington, and Livingston, Louisiana. The interferometers are used to detect gravitational waves, which are ripples in the fabric of spacetime.

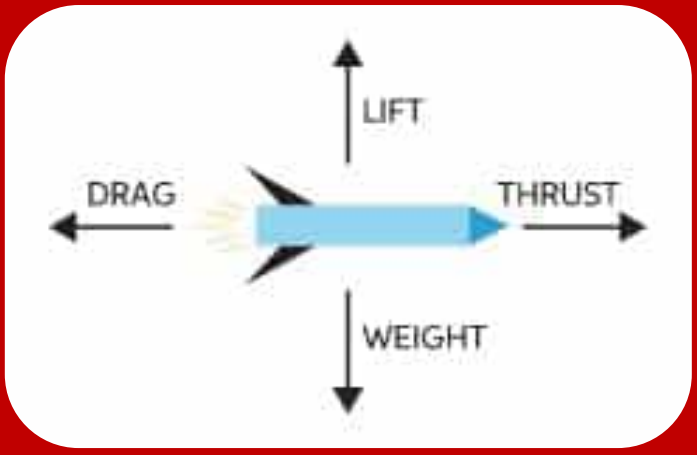
LIGO has made a number of important discoveries, including the first direct detection of gravitational waves. LIGO has also been used to study the merger of black holes and neutron stars. Interferometers are a powerful tool for studying the universe. They are used to study a variety of objects, including planets, stars, and galaxies. Interferometers are also used to detect gravitational waves, which are ripples in the fabric of spacetime. Here are some of the benefits of using interferometers in space: High precision: Interferometers can measure distances with very high precision. This allows scientists to study objects that are very small or very far away. 3D data: Interferometers can produce 3D data of objects. This allows scientists to study the shape and structure of objects in detail. Nondestructive: Interferometers are non-destructive remote sensing technologies. This means that they do not damage the object being studied. This is important for studying objects that are rare or valuable.
Wide range of applications: Interferometers can be used for a wide range of applications in space, including mapping the surface of planets, studying the atmosphere of other planets, and detecting asteroids and comets.

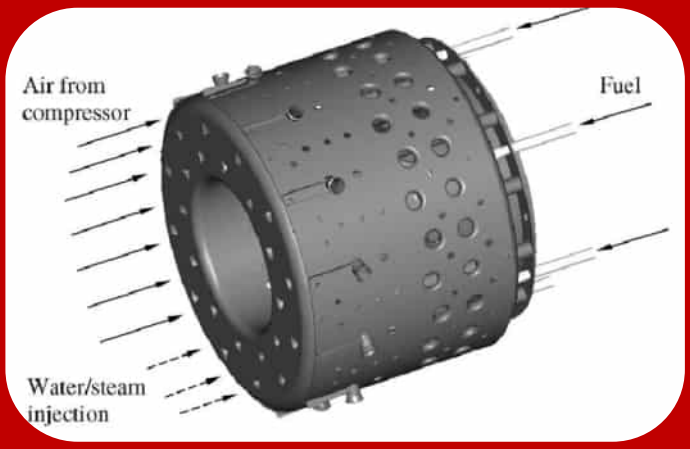
Interferometers are a powerful tool for space exploration. They have the potential to revolutionize our understanding of the universe and to help us to explore new worlds.

Space Terms to know about

Thrust :

The force that propels a rocket forward by expelling high-speed exhaust gases in the opposite direction.



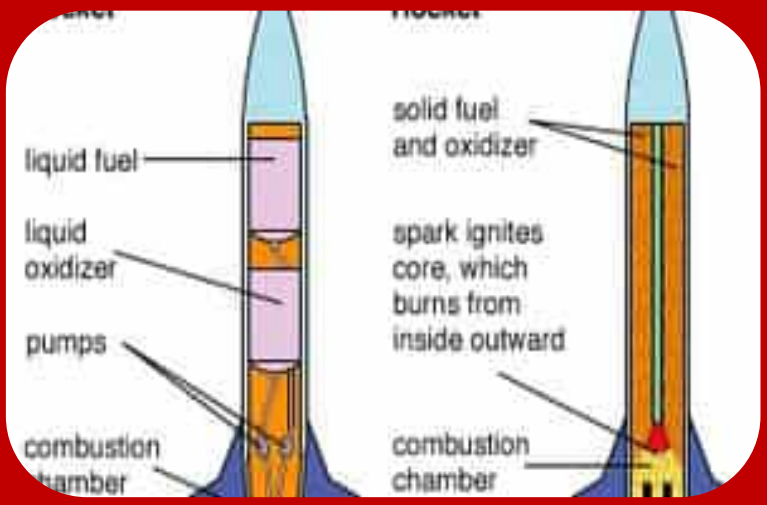


Combustion Chamber :

The part of the rocket engine where fuel and oxidizer are mixed and burned to produce high-pressure, high-temperature gases.

Propellant :

The combination of fuel and oxidizer used in a rocket engine. Common propellants include liquid oxygen (LOX) and liquid hydrogen (LH2) in cryogenic engines, or a combination of liquid or solid propellants in other types of engines.



Space-Tech Company

ENDUROSAT

EnduroSat is a Bulgarian aerospace manufacturer that designs, builds, and operates CubeSats and Nanosatellites for commercial and scientific missions. The company is committed to making space more accessible and affordable for everyone.