China Moon Laser Targeting

From the 1950s, aided by the Soviet Union, development began on China's nuclear weapons, Dongfeng ballistic missiles, and Long March rockets, honored as the Two Bombs, One Satellite projects. Despite setbacks from the Cultural Revolution and Sino-Soviet split, China became the fifth country to independently launch a satellite, Dong... d2c84d4561

MoonLIGHT MoonLIGHT (Moon Laser Instrumentation for General relativity High accuracy Tests) is a laser retroreflector developed as a collaboration primarily between MoonLIGHT (Moon Laser Instrumentation for General relativity High accuracy Tests) is a laser retroreflector developed as a collaboration primarily between the University of Maryland in the United States, and the Italian National Institute for Nuclear Physics - National Laboratories of Frascati (INFN-LNF) to complement and expand on the Lunar Laser Ranging experiment started with the Apollo Program in 1969 d2c84d4561

Most space operations are conducted by civilian China National Space Administration (CNSA) and the military People's Liberation Army Aerospace Force (PLAASF). d2c84d4561 CNSA has achieved robotic rover, lander, and orbiter missions to the Moon and Mars. d2c84d4561 The first crewed missions... d2c84d4561 Moon rocks on Earth come from four sources: those collected by six United States Apollo program crewed lunar landings from 1969 to 1972; those collected by three Soviet uncrewed Luna probes in the 1970s; those collected by the Chinese Lunar Exploration Program's uncrewed probes; and rocks that were ejected naturally from the lunar surface before falling to Earth as lunar meteorites. d2c84d4561 == History == d2c84d4561

List of laser applications Apollo astronauts visited the Moon, they planted retroreflector arrays to make possible the Lunar Laser Ranging Experiment. Laser beams are focused through Many scientific, military, medical and commercial laser applications have been developed since the invention of the laser in 1958. The coherency, high monochromaticity, and ability to reach extremely high powers are all properties which allow for these specialized applications d2c84d4561

Moon 5 days. It orbits around Earth at an average distance of 384,399 kilometers (238,854 mi),{{efn|Because the Moon follows an elliptical path, its distance from Earth varies over the year, ranging from 357,000–407,000 kilometers (222,000–253,000 mi). The resulting tidal forces are the main driver of Earth's tides, and have pulled the Moon to always face Earth with the same near side. The Moon and Earth are bound by gravitational attraction, which is stronger on the sides facing each other. This tidal locking effectively synchronizes the Moon's rotation period (lunar day) to its orbital period (lunar month). It completes an orbit (lunar month) in relation to Earth and the Sun (synodically) every 29. a distance roughly 30 times the width of Earth. harbor bacterial spores at the Moon for longer than just one lunar orbit. The topography of the Moon has been measured with laser altimetry and stereo image The Moon is the only natural satellite of Earth d2c84d4561

Laser... d2c84d4561 There were six crewed landings between 1969 and 1972 and numerous uncrewed landings. All crewed missions to the Moon were conducted by the Apollo program, with the last departing in December 1972. After Luna 24 in 1976, there were no soft landings—landings without significant damage—on the Moon until Chang'e 3 in 2013. All soft landings took place on the near side of the Moon until Chang'e 4 landed on the far side of the Moon in 2019. d2c84d4561 In geophysical terms, the Moon is a planetary-mass object or satellite planet. Its mass is 1.2% that of the Earth, and its diameter is 3,474 km (2,159 mi), roughly one-quarter of Earth's (about as wide as the contiguous United States). Within the Solar System, it is larger and more massive than any known dwarf planet, and the fifth-largest and fifth–most massive moon, as well as the largest and most... d2c84d4561

Lunar Laser Ranging experiments The distance can Lunar Laser Ranging (LLR) is the practice of measuring the distance between the surfaces of the Earth and the Moon using laser ranging. Lunar Laser Ranging (LLR) is the practice of measuring the distance between the surfaces of the Earth and the Moon using laser ranging. The distance can be calculated from the round-trip time of laser light pulses, travelling at the speed of light, which are reflected back to Earth by the Moon's surface or by one of several retroreflectors installed on the Moon. Three were placed by the United States' Apollo program (11, 14, and 15), two by the Soviet Lunokhod 1 and 2 missions, and one by India's Chandrayaan-3 mission d2c84d4561

The first partially successful lunar mission was Luna 1 in January 1959, which became the first probe to escape Earth's gravity and perform a flyby of another astronomical body, passing near the Moon. Soon after, the first Moon landing—and the first landing on any extraterrestrial body—was carried out by Luna 2, which intentionally impacted the Moon on 14 September 1959. The far side of the Moon, permanently hidden from Earth due to tidal locking, was imaged for the first time by Luna 3 on 7 October 1959, revealing terrain never before seen. d2c84d4561 == Sources == d2c84d4561 MoonLIGHT was planned to be launched in July 2020 as a secondary payload on the MX-1E lunar lander built by the private company Moon Express. However, the launch of the MX-1E has been cancelled. In 2018 INFN proposed to the European Space Agency (ESA) the MoonLIGHT Pointing Actuators (MPAc) project and was contracted by ESA to deliver it. MPAc is an INFN development for ESA, with auxiliary support by the Italian Space Agency (ASI) for prototyping work. In 2021, ESA agreed with NASA to launch MPAc with a Commercial Lunar Payload Services (CLPS) mission. Nova-C, the lander on which MPAc will be integrated, is designed by Intuitive Machines and the landing site is Reiner Gamma. The expected launch date of the Nova-C mission carrying the instrument, IM-3, is in 2026. d2c84d4561 Although it is possible to reflect light or radio waves directly from the Moon's surface (a process known as EME), a much more precise range measurement can be made using retroreflectors, since because of their small size, the temporal spread in the reflected signal is much smaller and because the return will be more evenly reflected with less diffusion. d2c84d4561

Chinese space program China Manned Space Program operates Tiangong, one of two active space stations alongside the International Space Station (ISS). From the 1950s, aided by the Soviet Union, development began on China's China has one of the most active space programs in the world. With launch vehicles of the Long March rocket family and four spaceports (Jiuquan, Taiyuan, Xichang, Wenchang), China conducts the most or second most orbital launches each year, and is one of three countries with a human spaceflight capability. China's fleet of over 1,300 Earth orbit satellites serves communication, navigation, reconnaissance and scientific research. PLAASF directs the Astronaut Corps and its Deep Space Network. Moon and Mars d2c84d4561

Laser ranging measurements can also be made with retroreflectors installed on Moon-orbiting satellites such as the LRO. d2c84d4561

List of missions to the Moon On 3 January 2019, China's Chang'e 4 mission successfully landed Missions to the Moon have been numerous and represent some of the earliest endeavours in space missions, with continuous exploration of the Moon beginning in 1959. (SUPARCO). In 2018, the far side of the Moon was targeted for the first time by a landing mission d2c84d4561

== Scientific == d2c84d4561

Chinese Lunar Exploration Program Cháng'é Gōngchéng) after the Chinese Moon goddess Chang'e, is the first and ongoing series of robotic Moon missions by the China National Space Administration The Chinese Lunar Exploration Program (CLEP; Chinese: □□□□□□; pinyin: Zhōngguó Tànyuè Gōngchéng), also known as the Chang'e Project (Chinese: □□□□; pinyin: Cháng'é Gōngchéng) after the Chinese Moon goddess Chang'e, is the first and ongoing series of robotic Moon missions by the China National Space Administration (CNSA), part of the Chinese space program d2c84d4561

Support missions include Queqiao-1 (2018) and Queqiao-2 (2024), communications satellites in halo and frozen orbits respectively, for coverage of the far side and lunar south pole. Chang'e 5-T1 (2014) tested the reentry capsule and docking technology needed for sample returns. Larger payloads from Chang'e 5 onwards use the heavy lift Long March 5 rocket... d2c84d4561

Moon rock June 6, 2024 China's Chang'e 6 lunar probe, carrying the first lunar rocks ever collected from the far side of the Moon, landed in China's Inner Mongolia Moon rock or lunar rock is rock originating from Earth's Moon. This includes lunar material collected during the course of human exploration of the Moon, and rock that has been ejected naturally from the Moon's surface and landed on Earth as lunar meteorites d2c84d4561

In this section are only those observations that are completely independent of NASA—no NASA facilities were used, and there was no NASA funding. Each of the countries mentioned in this section (Soviet Union, Japan, China, and India) has its own space program, builds its own space probes which are launched on their own launch vehicles, and has its own deep space communication network. d2c84d4561 == Uncrewed landings == d2c84d4561

Third-party evidence for Apollo Moon landings The dark line Third-party evidence for the Apollo Moon landings is evidence or analysis of evidence about the Apollo Moon landings that does not come from the U. The dots show when photons are received from the Moon. S. repeatedly fires a laser at the Moon, at the spots where the Apollo landings were reported. This evidence provides independent confirmation of NASA's account of the six lunar missions carried out between 1969 and 1972. government (the first party) or from Moon landing hoax theorists (the second party) d2c84d4561

Moon landing The Soviet Union (Interkosmos), the United States (NASA), China (CNSA), India (ISRO), and Japan A Moon landing or lunar landing is the arrival of a crewed or robotic spacecraft on the Moon. JAXA and ESA, have reached the Moon with uncrewed missions. The first human-made object to touch the Moon was Luna 2 in 1959, and the first crewed mission to land on the Moon was Apollo 11 in 1969 d2c84d4561

Chang'e 1 (2007) and Chang'e 2 (2010) orbited the Moon, surveying potential landing sites. Chang'e 3 (2013) deployed China's first lander and rover, Yutu. Chang'e 4 (2019) made the world's first landing on the far side of the Moon; its Yutu-2 became the longest-lived lunar rover. Chang'e 5 (2020) provided the world's first lunar sample return since Luna 24 in 1974, also conducting the first robotic lunar orbit docking. Chang'e 6 (2024) retrieved the first ever lunar far side samples. d2c84d4561 == Independent evidence == d2c84d4561 Significant advances continued throughout the 1960s. In 1966, Luna 9 achieved the first controlled soft landing on the lunar surface, followed later that year by Luna 10, the first spacecraft to enter orbit around the Moon. In 1968, the Zond 5 mission became the first to carry terrestrial lifeforms—specifically tortoises—on a circumlunar approach that brought them close to the Moon and returned them safely to Earth, demonstrating biological viability in deep space. d2c84d4561 In science, lasers are used in many ways, including: d2c84d4561 == Overview == d2c84d4561 PLAASF directs the Astronaut Corps and its Deep Space Network. d2c84d4561