India's Moon probe enters lunar orbit

Rover – Pragyan

Chandrayaan 2's Rover is a 6-wheeled robotic vehicle named Pragyan, which translates to 'wisdom' in Sanskrit. It can travel up to 500 m (‰-a-km) and leverages solar energy for its functioning. It can only communicate with the Lander

Orbitor

At the time of launch, the Chandrayaan 2 Orbiter will be capable of communicating with Indian Deep Space Network (IDSN) at Byalalu as well as the Vikram Lander. The mission life of the Orbiter is one year and it will be placed in a 100X100 km lunar polar orbit.

Lander – Vikram

The Lander of Chandrayaan 2 is named Vikram after Dr Vikram A Sarabhai, the Father of the Indian Space Programme. It is designed to function for one lunar day, which is equivalent to about 14 Earth days. Vikram has the capability to communicate with IDSN at Byalalu near Bangalore, as well as with the Orbiter and Rover. The Lander is designed to execute a soft landing on the lunar surface.

- **The craft completed its Lunar Orbit Insertion as planned**
- **Chandrayaan 2 will undergo four more similar manoeuvres**
- **Probe will land on the lunar South Pole on September 7**
- **The mission will help scientists to better understand the origin and evolution of the Moon**

Bangalore, India

India's Chandrayaan 2 spacecraft entered lunar orbit yesterday, executing one of the trickiest manoeuvres on its historic mission to the Moon.

After four weeks in space, the craft completed its Lunar Orbit Insertion as planned, the Indian Space Research Organisation (ISRO) said in a statement.

The insertion "was completed successfully yesterday at 0902 hrs IST (0332 GMT) as planned, using the onboard propulsion system. The duration of manoeuver was 1738 seconds," the national space agency said.

India is seeking to become just the fourth nation after Russia, the United States and China to land a spacecraft on the Moon.

If the rest of the mission goes to plan, the Indian probe will land on the lunar South Pole on September 7.

To enter the final orbit over the lunar poles, Chandrayaan 2 will undergo four more similar manoeuvres, with the next scheduled for Wednesday.

ISRO chief K. Sivan said the manoeuvre was a key milestone for the mission, adding he was hoping for a perfect landing next month.

"On September 7, the lander will land on the moon. Whatever is humanly possible, has been done by us," Sivan told reporters.

Tuesday's insertion was one of the trickiest operations in the mission because if the satellite had approached the Moon at a higher velocity it would have bounced off and got lost in deep space.

And had it approached at a slow velocity, the Moon's gravity would have pulled it in, causing a crash.

Heart-stopping moments

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"Our heartbeats increased... for 30 minutes, our hearts almost stopped."

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>
> KAILASAVADIVOO SIVAN
> CHAIRMAN OF THE INDIAN SPACE RESEARCH ORGANISATION (ISRO)

Chandrayaan 2, or Moon Chariot 2, lifted off from India's spaceport at Sriharikota in southern Andhra Pradesh state on July 22.

The spacecraft used in the mission comprises an orbiter, a lander and a rover almost entirely designed and made in India. The orbiter has a mission life of a year and will take images of the lunar surface.

ISRO says the mission will help scientists to better understand the origin and evolution of the Moon by conducting detailed topographical studies, mineral analyses and a host of other experiments.

About $140 million was spent on preparations for the probe's mission -- a much smaller price tag compared to similar operations by other countries.

It was launched on India's most powerful rocket, the Geosynchronous Satellite Launch Vehicle (GSLV) MkIII.

The lift-off was successful in its second attempt, a week after it was aborted just under an hour from its launch due to a technical glitch.

India's first lunar mission in 2008 -- Chandrayaan-1 -- did not land on the Moon, but carried out a search for water using radar.

A soft landing on the Moon would be a huge leap forward in India's space programme, with Prime Minister Narendra Modi determined to launch a manned mission into space by 2022.

India also has ambitions to land a probe on Mars. In 2014, India became only the fourth nation to put a satellite into orbit around the Red Planet.

Chairman of the Indian Space Research Organisation (ISRO) Kailasavadivoo Sivan holds up a model of the Chandrayaan 2 spacecraft during a press conference at the ISRO headquarters in Bangalore

New planet discovered in orbit of young Milky Way star

Paris, France

A second planet has been discovered circling Beta Pictoris, a fledgling star in our own galaxy offering astronomers a rare glimpse of a planetary system in the making, according to a study published Monday.

"We are talking about a giant planet about 3,000 times more massive than Earth, situated 2.7 times further from its star than the Earth is from the Sun," said Anne-Marie Lagrange, an astronomer at France's National Centre for Scientific Research and lead author of a study in Nature Astronomy.

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> AN ASTRONOMER

The new planet, b Pictoris c, completes its orbit roughly every 1,200 days. Like its big sister b Pictoris b, discovered by Lagrange and her team in 2009, it is a gassy giant.

Visible with the naked eye, Beta Pictoris -- with a mass nearly twice that of the Sun -- is a newborn by comparison: only 23 million years old.

The Sun is more than 4.5 billion years old.

It is also relatively nearby, just over 63 light years, and surrounded by a disk of stellar dust.

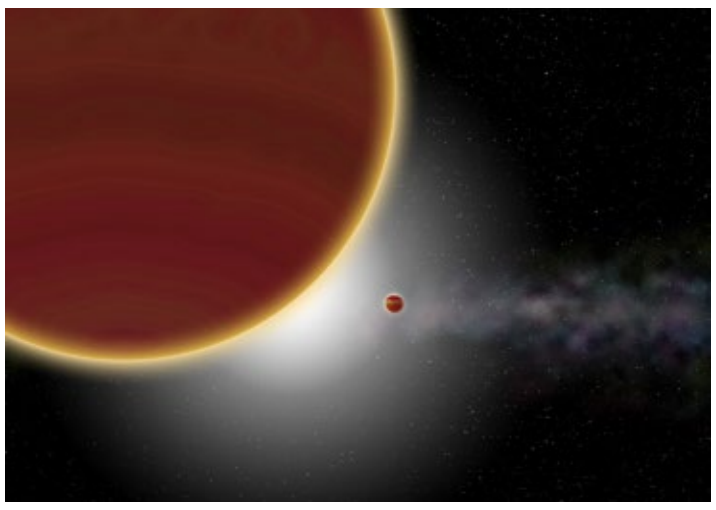
This swirling halo of debris and gas was the first such configuration to be captured in image, making Beta Pictoris a celebrity star in the 1980s.

"To better understand the early stage of formation and evolution, this is probably the best planetary system we know of," Lagrange told AFP.

Observations show that the two planets are still taking shape.

B Pictoris c was discovered by analysing 10-years worth of high-resolution data obtained with instruments at the La Silla Observatory in northern Chile, run by the intergovernmental European Southern Observatory.

In 2014, scientists said b Pictoris b spins at a breakneck speed of some 25 kilometres per second (90,000 kph or 56,000 miles per hour).



An artist's view of the system b Pictoris