

Sunday, Feb 26, 2023  
EPAPER TODAY'S PAPER

# The Indian EXPRESS

JOURNALISM OF COURAGE

TRENDING Daily Buy monthly Elections Health Express [crown icon] Express UPSC  
News / Explained / Explained Sci-Tech / What is ALMA telescope, that will soon get a 'new brain'?

# What is ALMA telescope, that will soon get a 'new brain'?

Fully functional since 2013, ALMA has helped astronomers make groundbreaking discoveries, including that of starburst galaxies and the dust formation inside supernova 1987A

Written by [Alind Chauhan](#), Edited by Explained Desk  
New Delhi | Updated: February 27, 2023 00:38 IST



The Milky Way glitters above the ALMA array in this image taken from a time lapse sequence during the

## Listen to this article

05:04 1x 1.5x 1.8x

The Atacama Large Millimetre/submillimetre Array (ALMA) — a radio telescope comprising 66 antennas located in the Atacama Desert of northern Chile — is set to get software and hardware upgrades that will help it collect much more data and produce sharper images than ever before, the journal Science reported recently. It added that the upgrades would take around five years to finish and cost \$37 million.

The most significant modernisation made to ALMA will be the replacement of its correlator, a supercomputer that combines the input from individual antennas and allows astronomers to produce highly detailed images of celestial objects.

## RECOMMENDED FOR YOU

**1** [What can fighter jets do and why does Ukraine want them?](#)

**2** [The controversial story of Pluto, discovered on this day in 1930](#)

“Today, ALMA’s correlators are among the world’s fastest supercomputers. Over the next 10 years, the upgrade will double and eventually quadruple their overall observing speed,” said the National Research Council of Canada (NRC), whose Herzberg Astronomy and Astrophysics Research Centre will work along with the U.S. National Science Foundation (NSF) National Radio Astronomy Observatory (NRAO), Massachusetts Institute of Technology (MIT) Haystack Observatory and a Canadian industry partner to upgrade the telescope’s “brain”.

As ALMA is operated under a partnership among the United States, 16 countries in Europe, Canada, Japan, South Korea, Taiwan, and Chile, the announcement came after all the partners cleared the funding required for the improvements.

Fully functional since 2013, the radio telescope was designed, planned and constructed by the US’s National Radio Astronomy Observatory (NRAO), the National Astronomical Observatory of Japan (NAOJ) and the European Southern Observatory (ESO). Over the years, it has helped astronomers make

## What is ALMA?

ALMA is a state-of-the-art telescope that studies celestial objects at millimetre and submillimetre wavelengths — they can penetrate through dust clouds and help astronomers examine dim and distant galaxies and stars out there. It also has extraordinary sensitivity, which allows it to detect even extremely faint radio signals.

As mentioned before, the telescope consists of 66 high-precision antennas, spread over a distance of up to 16 km.

---

### **Also in Explained** | **The controversial story of Pluto, discovered on this day in 1930**

---

“Each antenna is outfitted with a series of receivers, and each receiver is tuned to a specific range of wavelengths on the electromagnetic spectrum. The antennas can be moved closer together or farther apart for different perspectives – like the zoom lens of a camera. The result is magnificent, never-before-seen imagery of deepest, darkest space,” according to a report published by Science Node. Producing a single image from all the antennas is done by the correlator, it added.

## Why is ALMA located in Chile's Atacama Desert?

ALMA is situated at an altitude of 16,570 feet (5,050 metres) above sea level on the Chajnantor plateau in Chile's Atacama Desert as the millimetre and submillimetre waves observed by it are very susceptible to atmospheric water vapour absorption on Earth. Moreover, the desert is the driest place in the world, meaning most of the nights here are clear of clouds and free of light-distorting moisture — making it a perfect location for examining the universe.

“For travelling from Japan, it takes 40 hours to get to the ALMA site in Chile including connection time. In spite of such a long distance, the selected site is still

## What are some of the notable discoveries made by ALMA?

With ALMA's capability of capturing high-resolution images of gas and dust from which stars and planets are formed and materials that could be building blocks of life, scientists are trying to find answers to age-old questions of our cosmic origins.

One of the earliest findings came in 2013 when it discovered starburst galaxies earlier in the universe's history than they were previously thought to have existed. "These newly discovered galaxies represent what today's most massive galaxies looked like in their energetic, star-forming youth", NRAO said in a statement.

Next year, ALMA provided detailed images of the protoplanetary disc surrounding HL Tauri — a very young T Tauri star in the constellation Taurus, approximately 450 light years from Earth — and "transformed the previously accepted theories about the planetary formation", ESO said.

In 2015, the telescope helped scientists observe a phenomenon known as the Einstein ring, which occurs when light from a galaxy or star passes by a massive object en route to the Earth, in extraordinary detail.

### ALSO READ



**What can fighter jets do and why does Ukraine want them?**



**Why Noam Chomsky has called the ChatGPT chatbot 'basically high-tech plag...**



**DigiYatra: These airports in India now have facial recognition technology...**



**Can India's BharOS replace Android, iOS? Tough road ahead**

More recently, as part of the Event Horizon Telescope project, a large telescope array consisting of a global network of radio telescopes, it provided the first image