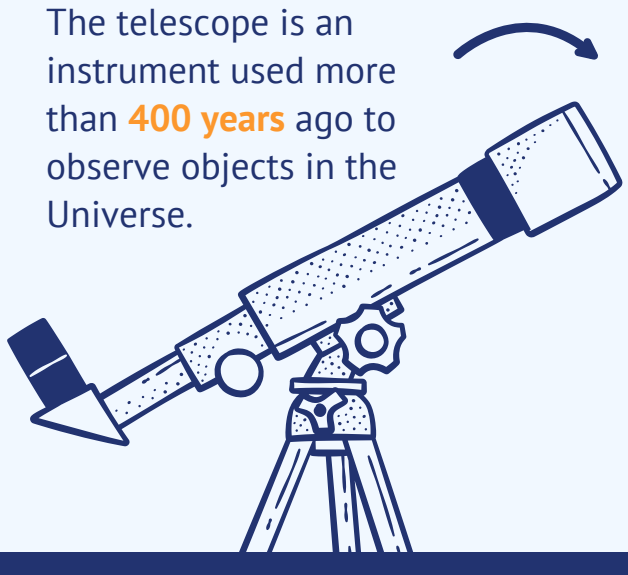
A GLIMPSE OF THE UNIVERSE

TELESCOPES

By **Daniela González**

The telescope is an instrument used more than **400 years** ago to observe objects in the Universe.



Conventional telescopes are built with lenses and mirrors, making it possible to magnify images of distant objects. But, like our eyes, they can only capture a **small fraction of the light** that reaches us from the Universe.

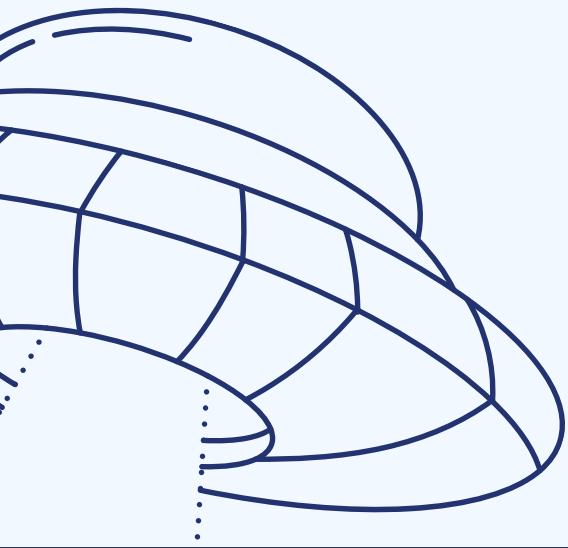
The scientific community developed telescopes that capture different wavelengths of light or **electromagnetic radiation**, allowing humans to reveal great discoveries about the Cosmos.

Radio **Microwaves** **Infrared** **Visible** **Ultra Violet** **X Rays** **Gamma Rays**

Long wavelengths (**lower energy**)

Short wavelengths (**higher energy**)

Human beings can only see a small part of the light that exists.

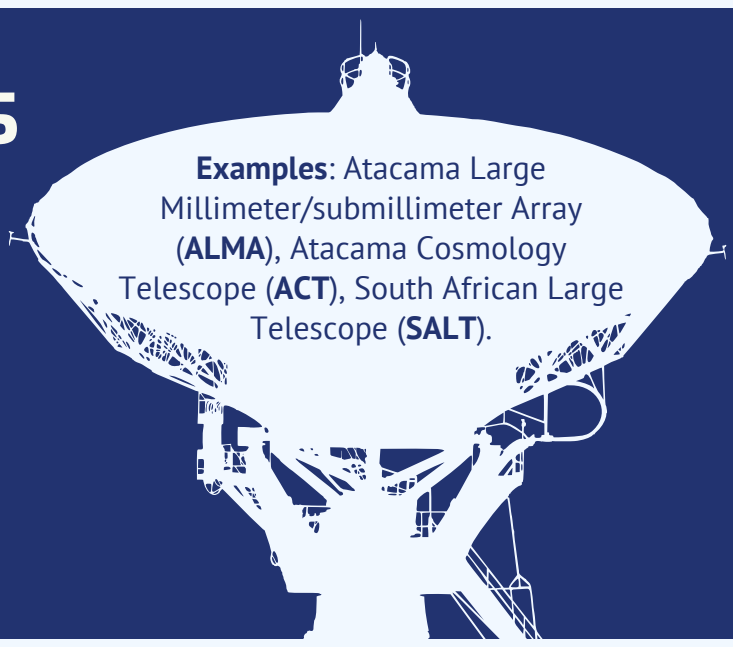


If we didn't study all the frequencies or wavelengths of light - known as the **electromagnetic spectrum** - it would be impossible today to know what a black hole, a supernova, and other objects are.

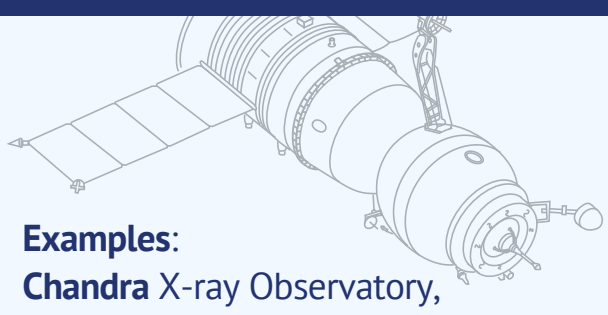
These different telescopes allow us to study the **mass**, **temperature** and **chemical composition**, among others, of distant objects. And, more importantly, whether nearby planets are **habitable** or could harbor life.

LONG WAVELENGTHS

Telescopes that capture long wavelengths, the least energetic part of the electromagnetic spectrum, are mostly **ground-based** and have **dish or parabola-shaped** antennas. They can capture the **coolest** and **faintest** processes and objects in the Universe, such as the gas and dust of star-forming nebulae, the remnants of supernovae, and much more.



Examples: Atacama Large Millimeter/submillimeter Array (**ALMA**), Atacama Cosmology Telescope (**ACT**), South African Large Telescope (**SALT**).



Examples:
Chandra X-ray Observatory, Compton Gamma-Ray Observatory (**CGRO**).

SHORT WAVELENGTHS

These waves are dangerous for life on Earth, but luckily, our atmosphere protects us from them. To be able to detect **high-energy** emissions from objects and processes such as galactic nuclei, black holes, and distant nebulae, it is necessary to observe them from **space**.

SUPER EYE

Telescopes like ALMA enable capturing astronomical data through extremely faint signals in the Universe and generating **images**. The higher their **sensitivity** and **resolution**, the better **data** they obtain from their observations.

COMPLEMENTARY

Both ground-based and space-based telescopes - with low and high energy radiation - need to **complement** and **share information** with each other. This allows astronomers to analyze the complete **electromagnetic spectrum** of studied astronomical objects.

ALMA ESO NAOJ National Astronomical Observatory of Japan NRAO