

What is LOW-Frequency ARray (LOFAR)?

October 27, 2025 • vajiramandravi.com



About LOW-Frequency ARray (LOFAR):

- It is a highly innovative, pan-European distributed **radio interferometer** and the first of its kind.
- It **observes the Universe at low radio frequencies**, close to the FM radio band, from 90 to 200 MHz.
- It was developed by the **Dutch Institute for Radio Astronomy (ASTRON)** with the goal of **exploring the early, distant universe, solar activity, and the terrestrial atmosphere.**
- LOFAR can **observe in several directions simultaneously**, which allows for a **multi-user operation.**
- For this reason, LOFAR is novel in its design because it is the **first telescope** that can **look at the entire sky at the same time**, unlike other telescopes which you have to point.
- LOFAR **does not have moving parts**; steering and tracking across the sky are achieved by **treating the signal from the individual antennas** in each station **with advanced digital beam-forming techniques** that make the system agile, allowing for rapid repointing of the telescope as well as giving the potential for multiple simultaneous observations in different directions.

- The LOFAR **main core** is based in the north of the **Netherlands**, with **other stations** located in **France, Germany**, and the **United Kingdom**.

What are Radio Galaxies?

- **Radio Galaxies**, also known as **radio-luminous galaxies** or **radio-loud galaxies**, are a particular type of active galaxy that **emits more light at radio wavelengths** than at visible wavelengths.
 - These happen through the **interaction between charged particles and strong magnetic fields related to supermassive black holes at the galaxies' center**.
 - They are **driven by non-thermal emissions**.
 - They are **much bigger than** most of the **other galaxies** in the universe.
 - The **first radio galaxy** to be **discovered**, and still the brightest, is called **Cygnus A**.
-

Q1: What are black holes?

A black hole is a region in space where gravity pulls so much that even light can not get out. The gravity is so strong because matter has been squeezed into a tiny space. This can happen when a star is dying. Because no light can get out, it is difficult to detect a black hole. The largest black holes are called "supermassive." These black holes have masses that are more than 1 million suns together. Albert Einstein first predicted the existence of black holes in 1916, with his general theory of relativity.

Source: [Astronomers discover new radio galaxy using LOw-Frequency ARray \(LOFAR\)](#)

Source: <https://vajiramandravi.com/current-affairs/low-frequency-array-lofar/>

© Vajiram & Ravi. For personal use only.