

# About Telescopes

**Wikipedia definition:** A telescope is an instrument designed for the observation of remote objects and the collection of electromagnetic radiation. The first known practically functioning telescope is credited to the German-Dutch lensmaker Hans Lippershey in 1608. The name "Telescope" (from the Greek tele = 'far' and skopein = 'to look or see'; teleskopos = 'far-seeing') was a name given to Galileo Galilei's instrument for viewing distant objects. The name was invented by an unidentified Greek poet/theologian, present at a banquet held in 1611 by Prince Federico Cesi to make Galileo Galilei a member of the Accademia dei Lincei. "Telescope" can refer to a whole range of instruments operating in most regions of the electromagnetic spectrum.

## Types of telescopes

The name "telescope" covers a wide range of instruments and is difficult to define. They all have the attribute of collecting electromagnetic radiation so it can be studied or analysed in some manner. The most common type is the optical telescope. Other types also exist and are listed below.

### Optical telescopes

An optical telescope gathers and focuses light mainly from the visible part of the Electromagnetic spectrum (although some work in the infrared and ultraviolet). Optical telescopes increase the apparent angular size of distant objects, as well as their apparent brightness. Telescopes work by employing one or more curved optical elements - usually made from glass - lenses or mirrors - to gather light or other electromagnetic radiation and bring that light or radiation to a focus, where the image can be observed, photographed, studied, or sent to a computer. Optical telescopes are used for astronomy and in many non-astronomical instruments, including: theodolites (including transits), spotting scopes, monoculars, binoculars, camera lenses, and spyglasses. There are three main types:

- \* The refracting telescope which uses lenses to form an image.
- \* The reflecting telescope which uses an arrangement of mirrors form an image.
- \* The catadioptric telescope which uses mirrors combined with lenses, in front of the mirror or somewhere within the optical path, to form an image.

### Radio telescopes

Radio telescopes are directional radio antennae that often have a parabolic shape. The dishes are sometimes constructed of a conductive wire mesh whose openings are smaller than the wavelength being observed. Multi-element Radio telescopes are constructed from pairs or larger groups of these dishes to synthesize large "virtual" apertures that are similar in size to the separation between the telescopes: see aperture synthesis. As of 2005, the current record array size is many times the width of the Earth, utilizing space-based Very Long Baseline Interferometry (VLBI) telescopes such as the Japanese HALCA (Highly Advanced Laboratory for Communications and Astronomy) VSOP (VLBI Space Observatory Program) satellite. Aperture synthesis is now also being applied to optical telescopes using optical interferometers (arrays of optical telescopes) and Aperture Masking Interferometry at single reflecting telescopes. Radio telescopes are also used to collect microwave radiation, often used to help study the leftover Big Bang radiation, and also can be used to collect radiation when visible light is obstructed or faint, such as from quasars. Some radio telescopes are used by programs such as SETI and the Arecibo Observatory to search for extraterrestrial life. (see also: Wow! Signal)

### X-ray and gamma-ray telescopes

X-ray and gamma-ray radiation go through most metals and glasses, some X-ray telescopes use Wolter telescopes composed of ring-shaped "glancing" mirrors, made of heavy metals, that reflect the rays just a few degrees. The mirrors are usually a section of a rotated parabola and a hyperbola or ellipse. Gamma-ray telescopes refrain from focusing completely, and use coded aperture masks; the pattern of shadows the mask creates can be reconstructed to form an image.

These types of telescopes are usually on Earth-orbiting satellites or high-flying balloons, since the Earth's atmosphere is opaque to this part of the electromagnetic spectrum.