

The background is a dark navy blue. In the top-left corner, there are two overlapping parallelogram shapes: a blue one in front of a light green one. In the bottom-left corner, there is a circular inset showing a detailed, grayscale image of a printed circuit board (PCB) with various electronic components. In the top-right corner, there is a faint, grayscale image of a complex circuit board layout with many traces.

Telescopes

What is a Telescope ?

An optical instrument and lenses or their combination used to obtain images of distant objects.



History

- Pre Telescopic Observatories



Machu picchu



Stonehenge

History

- Galileo's Telescope





Functions of a Telescope

1. Collect and faint light coming from astronomical sources
2. Focus the collected light into a point or image

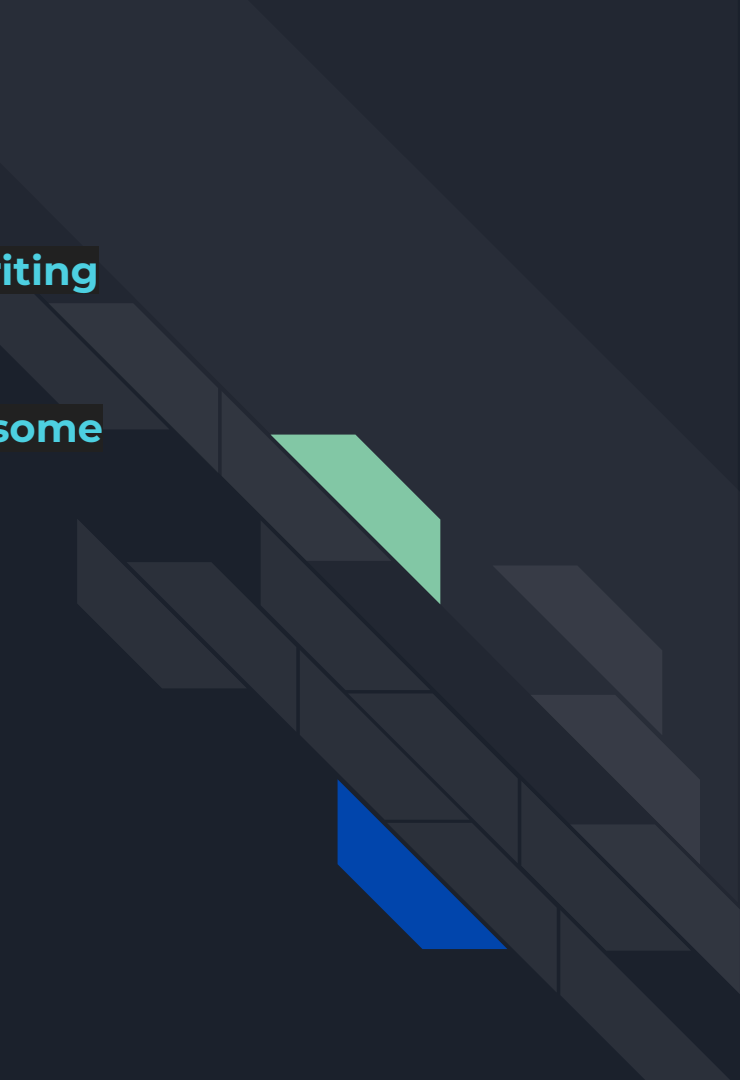
More the aperture(Light collecting area) , More the amount of entering light.



Components

Simply viewing the sky with a telescope and writing down descriptions is a very inefficient way

That is why modern telescopes usually involve some more components along with them

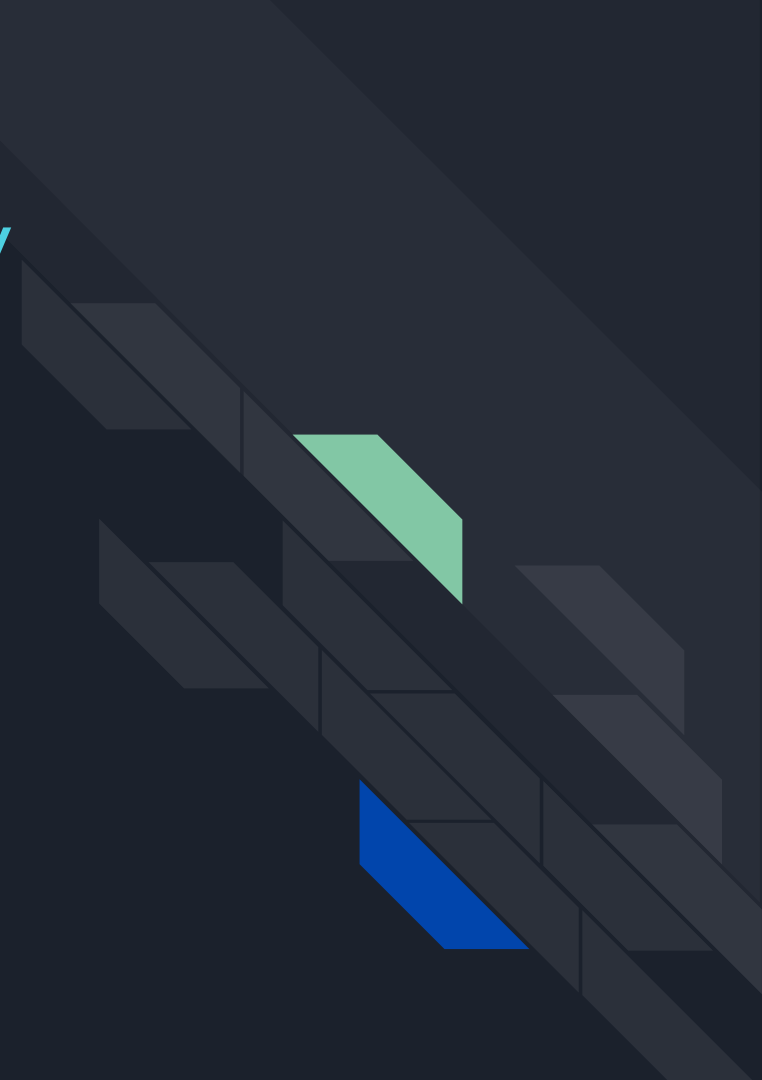
1. **Telescope** , which collects light.
 2. An **Instrument** to sort incoming radiation by wavelength as per need.
 3. A **Detector** to record the observations.
- 



Types of Telescope

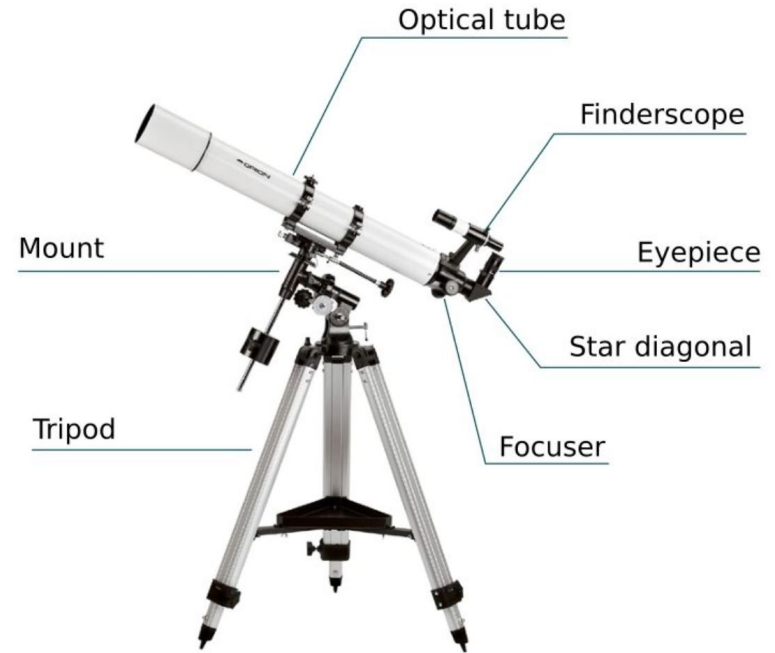
(Based on wavelength of light they observe)

1. X-Ray Telescopes
2. UV Telescopes
3. Optical Telescopes (Visible region)
4. Infrared Telescopes
5. Submillimeter telescopes (Microwave region)
6. Radio Telescopes



Parts of a Telescope

- **Minimum 2 lenses/mirrors**
- **Varying sizes of eyepiece are used**

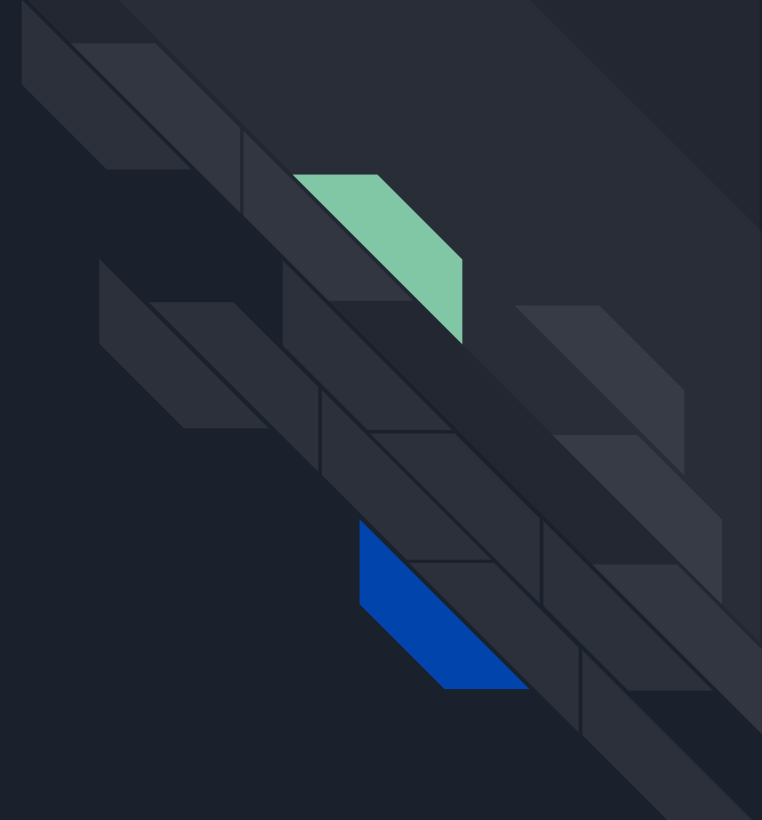


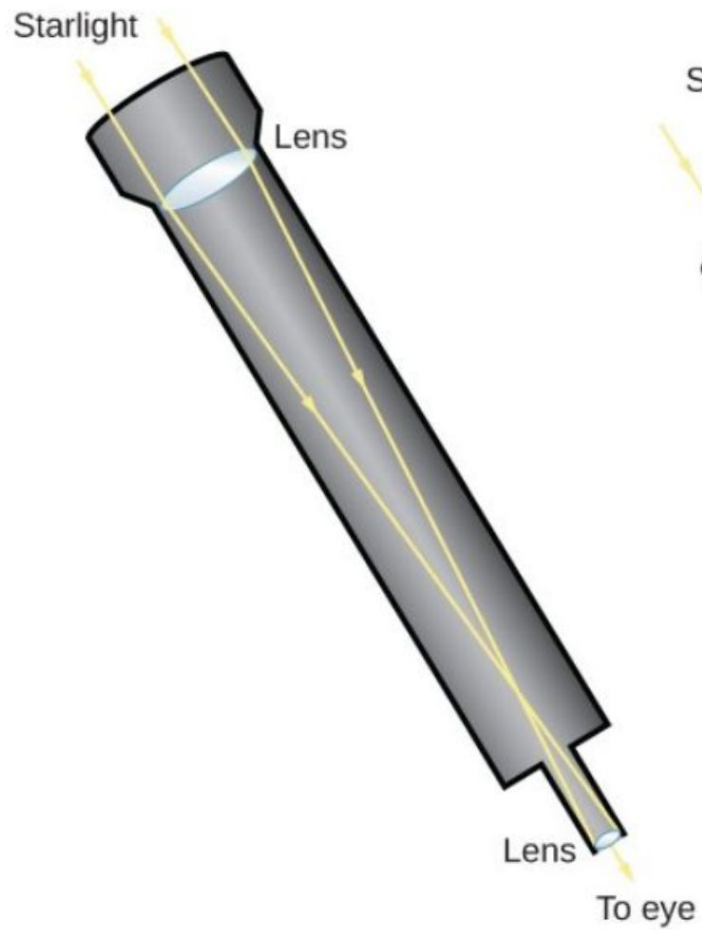




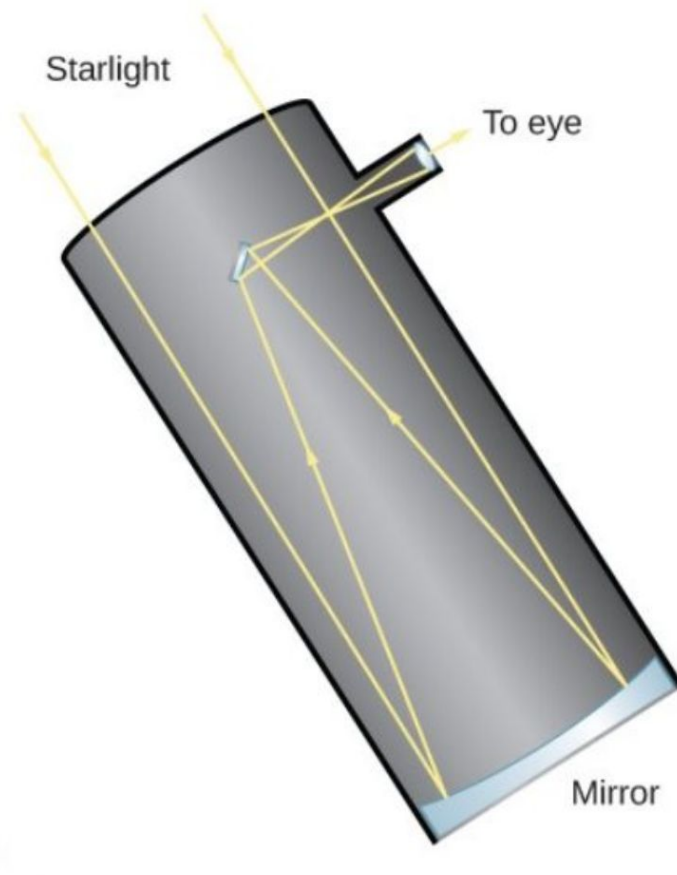
Types of Telescope

1. Refracting Telescopes : Uses lenses
2. Reflecting Telescopes : Uses mirrors
3. Catadioptric Telescopes : Combination of mirror and lenses

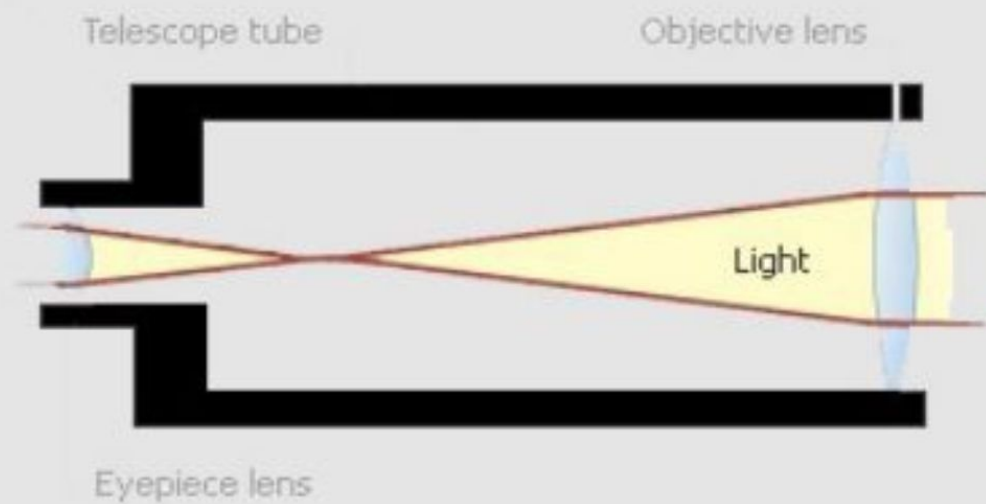


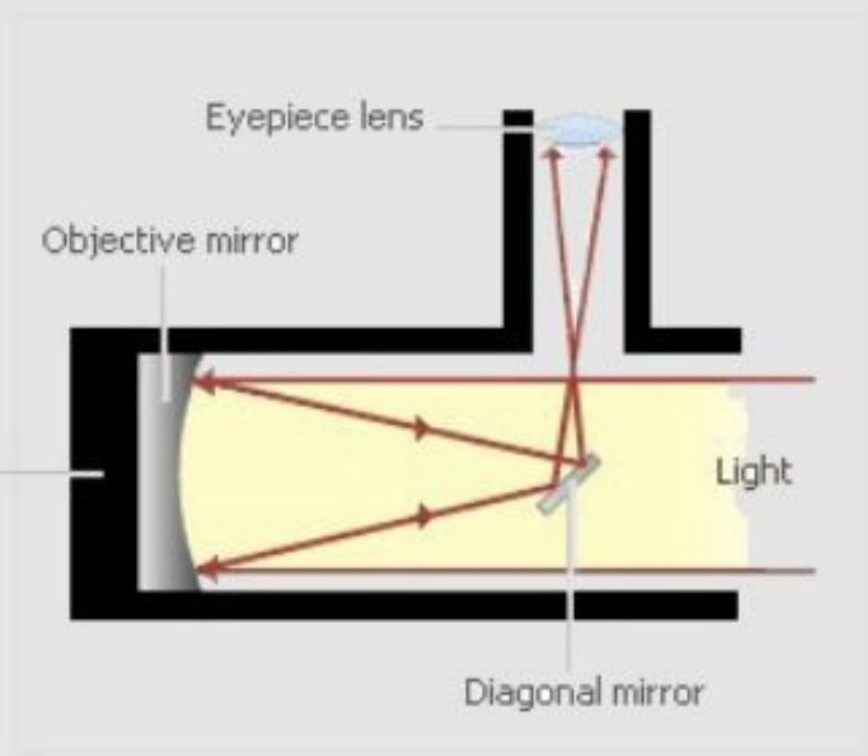


Refractor

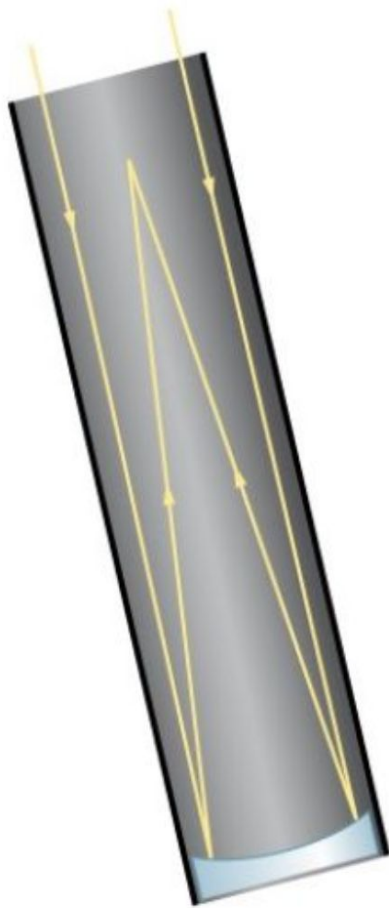


Reflector

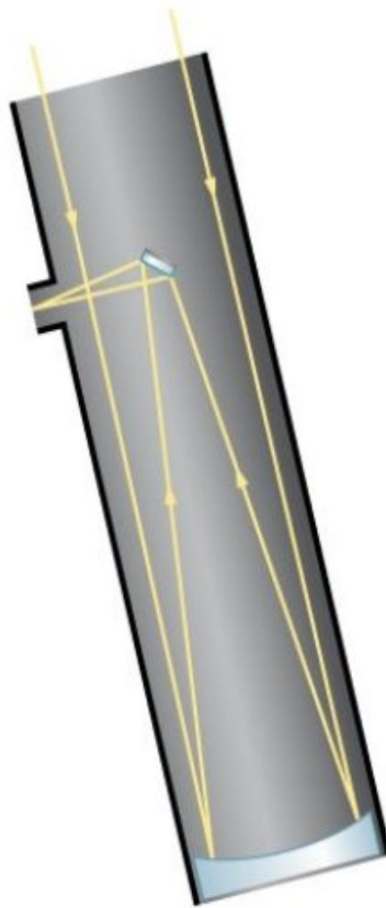




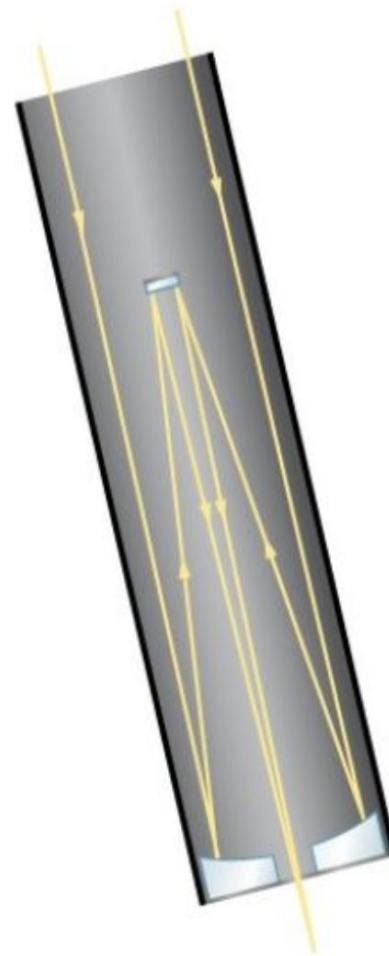
A problem with Refractors



Prime focus



Newtonian focus

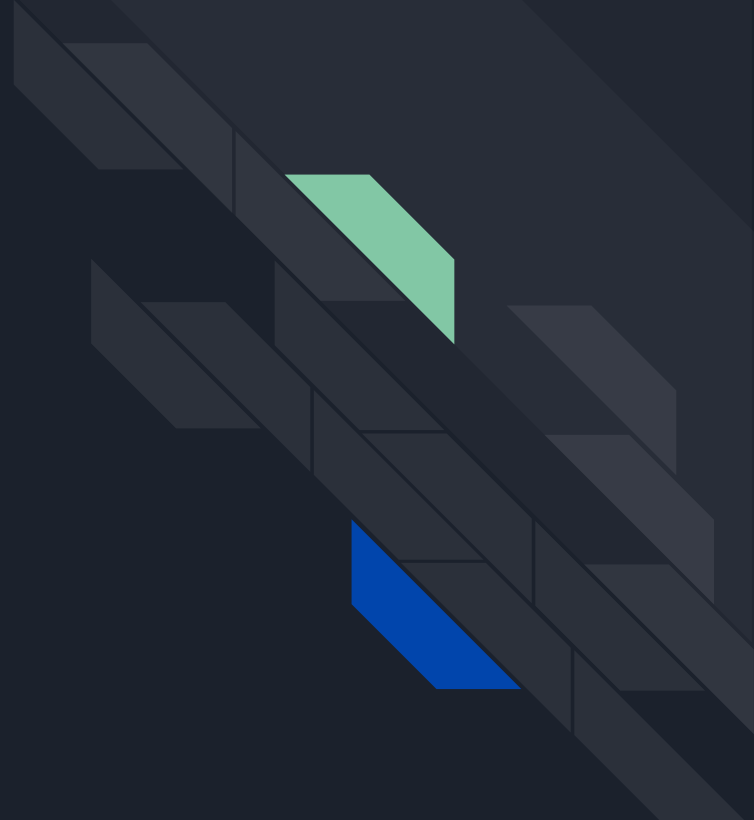


Cassegrain focus



Telescope Mounts

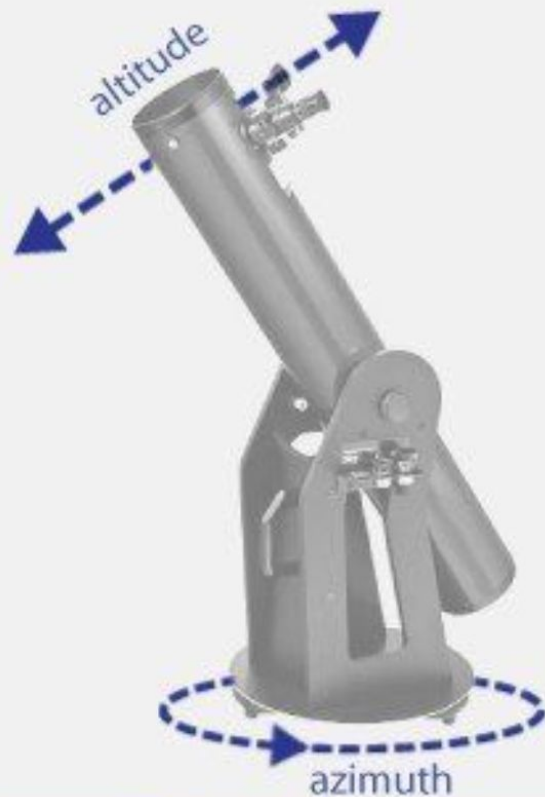
- Alt- Azimuth - Aligned with local zenith
- Equatorial- Aligned with polar axis and requires a heavy counter weight



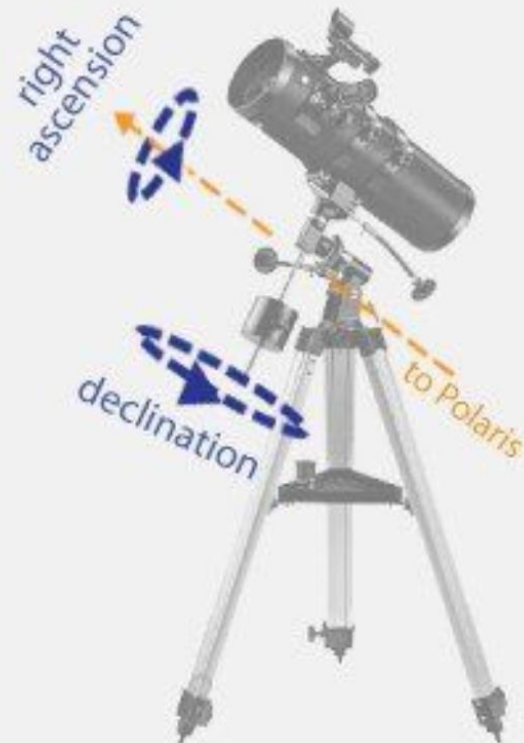
Comparison of Mount Types



Alt-Az



Dobsonian

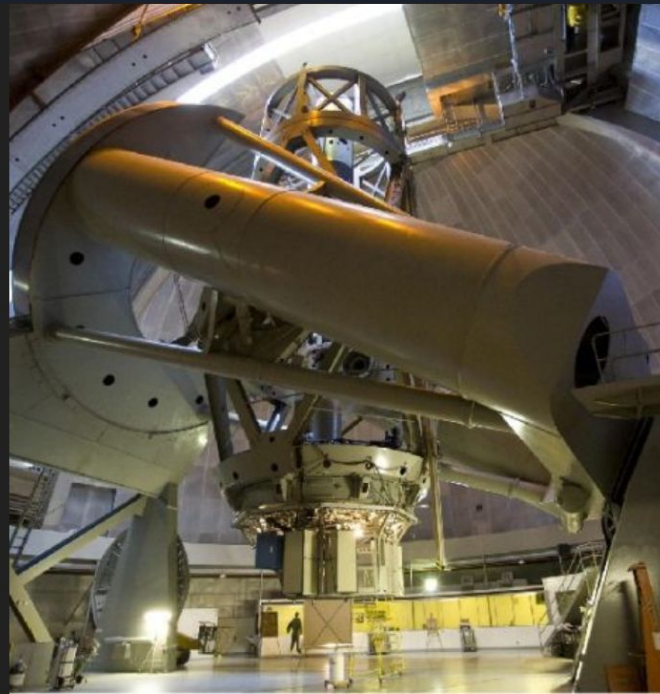
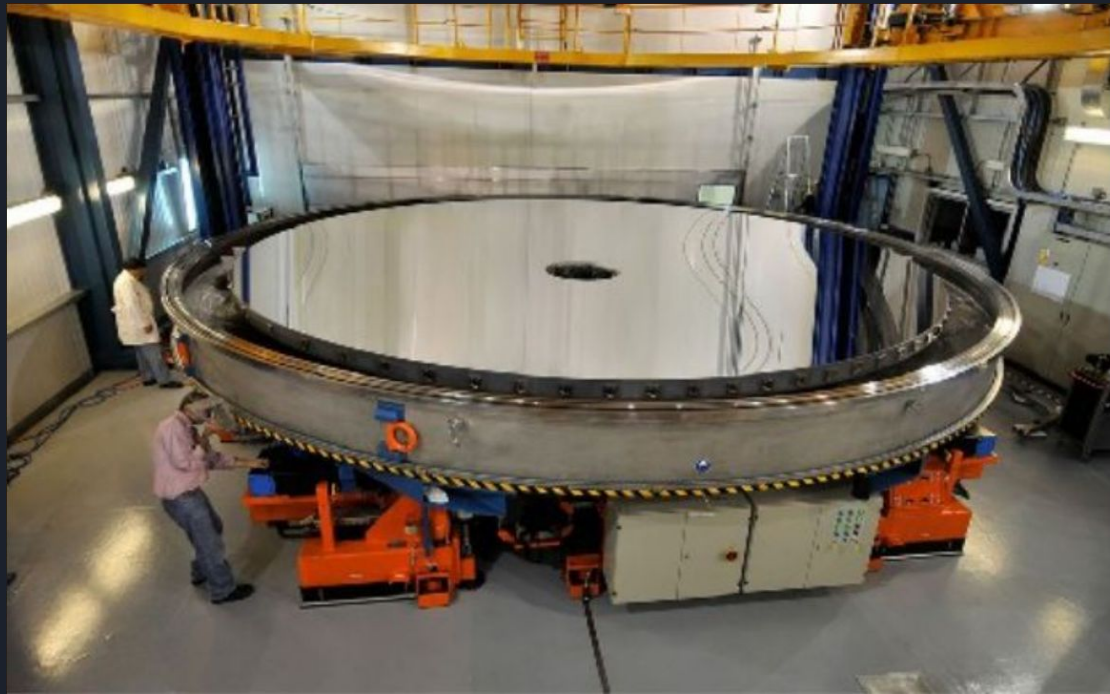


Equatorial



A Good Telescope ?

1. The key characteristics of a telescope is the aperture of the main mirror or the lens.
2. Magnification is not one of the criteria on which to base your choice of a telescope. The magnification of the image is done by a smaller eyepiece, so the magnification can be adjusted by changing eyepieces.
3. A sturdy and stable mount is essential

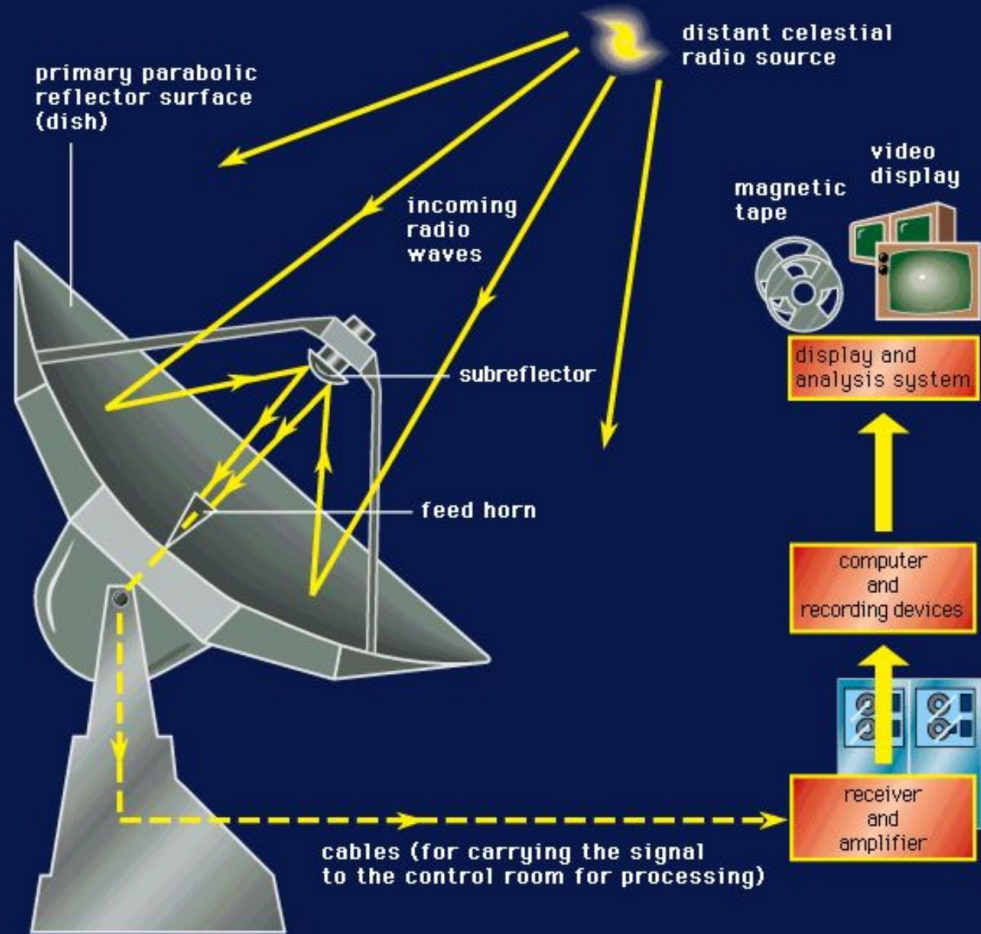




Radio Telescope

- Radio waves are not something which can be heard
- They can produce current in conductors (metal antenna or something similar)
- Radio waves are reflected by conducting surfaces
- A radio-reflecting telescope consists of a concave metal reflector (called a dish), analogous to a telescope mirror
- The radio waves collected by the dish are reflected to a focus, where they can then be directed to a receiver and analyzed
- Further methods like interferometry can be applied



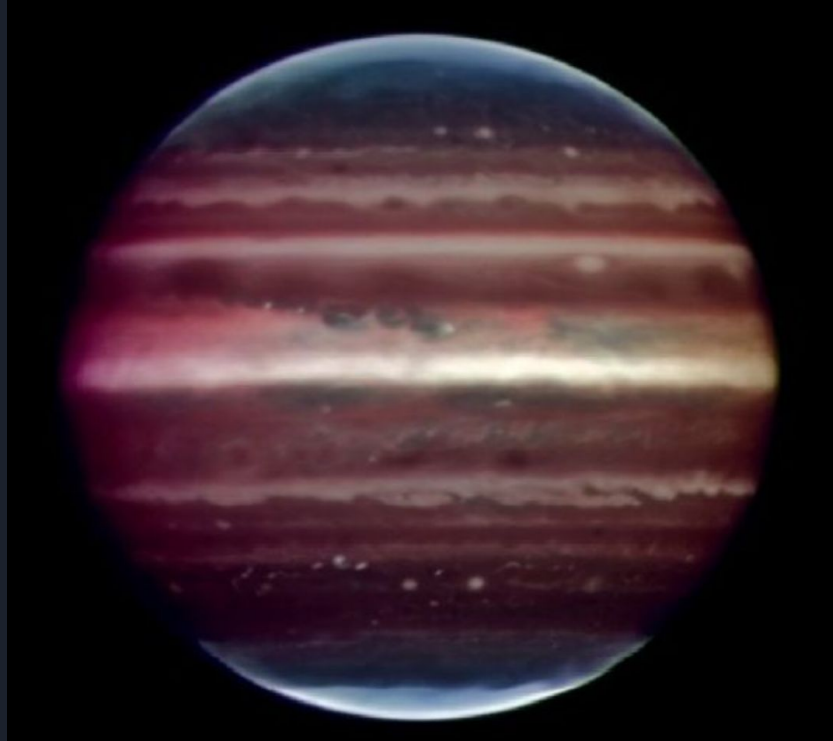




Resolution

- Resolution refers to precision of details present in image
- Depends on size of telescope; Large apertures produce sharper images
- Measured in units of arcseconds
- 1 arcsecond = $1/3600$ degree
- $\sin \alpha = 138/D$

Adaptive Optics



One of the clearest image of Jupiter taken from ground based telescope