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Reflecting Telescopes

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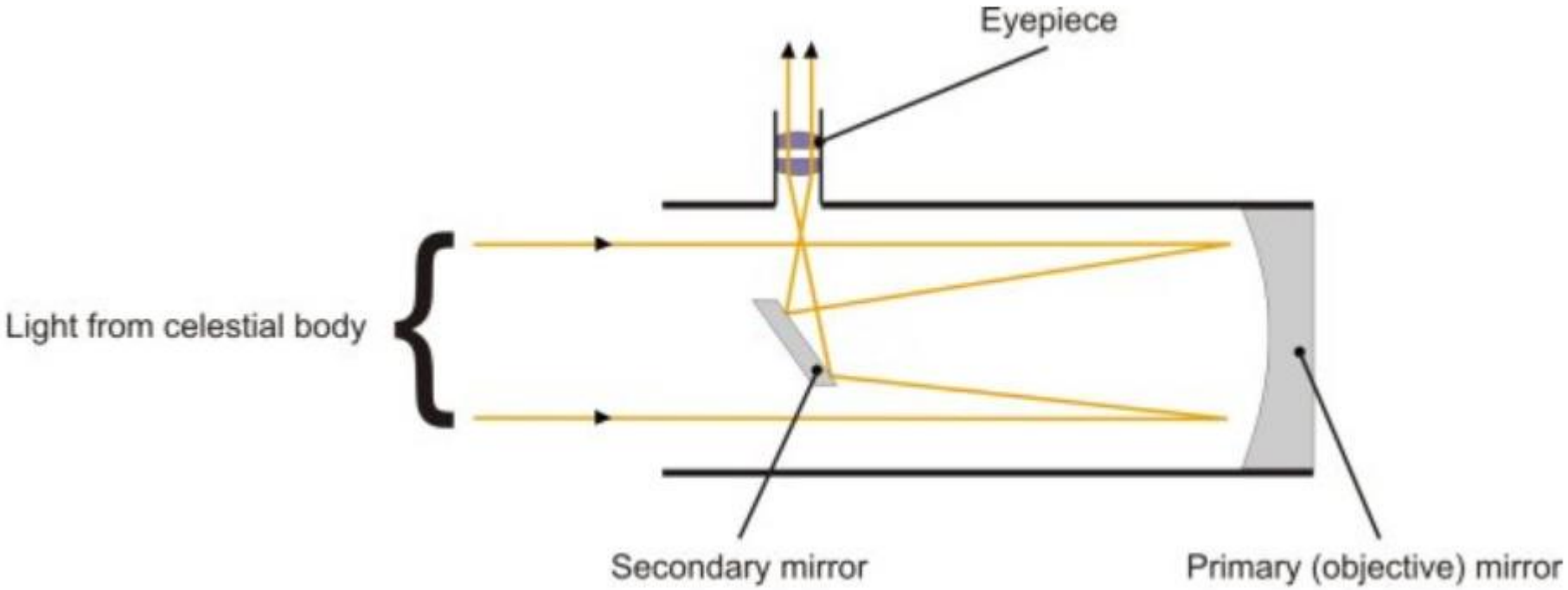
GENERAL

- combination of **curved mirrors** to collect and focus light
- The main reason for its invention

→ to eliminate **chromatic aberration**

Each color has its **wavelength** – when passing through the lens, each focuses at a different point, causing the image to appears **blurry** → chromatic aberration was a severe issue of refracting telescopes



<u>The main components of the reflecting telescope are:</u>

- an **open** optical tube,
- a **primary** mirror, and
- a **secondary** mirror.

PATH OF THE LIGHT

- The light enters the optical tube and travels to the **curved primary mirror**, which is located at the **bottom** of the tube
- The light rays are collected and then reflected towards the **secondary mirror**
- Depending on the design, the light is brought to a focus on the side of the telescope (**Newtonian** design) or reflected through a hole in the primary mirror (**Cassegrain** design)

PRIMARY MIRROR

- For perfect image and **round stars** around the fields of view, a **hyperbolic** primary mirror is used
- But because such a mirror is very expensive, a **parabolic** mirror is often used instead
- The parabolic mirror collects and then focuses the light rays at the **same** point. Because of that, this type of telescope doesn't suffer from chromatic nor spherical aberration, but it does face a defect called **coma** aberration
- This defect causes stars to have a "**comet-shape**" appearance — the error **increases** with the distance from the center of the mirror

- A reflector features an **open** tube → **dust** can **accumulate** in the tube → needs frequent **cleaning**
- Occasional maintenance → **collimation**
- Primary and secondary mirrors can get out of **alignment** → need to be adjusted
- Popular among professionals and also amateurs
- They are especially useful for "deep-sky" observations
- This type of telescope is also used for observing stars and planets, and the surface of the Moon

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