

Telescope Interiors and Mounts: A Comparison

Materials Needed—

- Newtonian telescope, no mount
- Schmidt–Cassegrain telescope, no mount
- Refracting telescope, no mount (e.g., finder scope)
- 6” Dobsonian telescope on Alt–Az mount
- 6” Schmidt–Cassegrain on equatorial mount

Introduction— Telescopes are useful to astronomers for two reasons: light-gathering ability and magnification. It is their light-gathering ability that allows us to see very faint objects in the heavens. Astronomers use three main types of telescopes: refractors (i.e., Galileans), reflectors (i.e., Newtonians), and hybrid catadioptrics (i.e., Schmidt–Cassegrains). At this station, you will investigate how light makes its way through a telescope in order to develop a sense for the advantages and disadvantages of the most common telescope designs. (At another station you will explore magnification.)

Furthermore, there are two main types of telescope mounts: Altitude–Azimuthal mounts (usually abbreviated as “Alt–Az”) and equatorial mounts (also called polar mounts). Like the different telescope types, each mount has its advantages and disadvantages, which you will soon discover.

Procedure—

1. Take a few minutes to closely examine each telescope. Note how light enters each one, where the observer places their eye, what sort of surfaces reflect or transmit light, etc. For each telescope, sketch a diagram of how light makes its way through from the main aperture to the observer’s eye.
2. Now investigate the two different mount types. Move the telescopes attached to each to point at different objects around the room. Note how easy or difficult it is to move to your target and what adjustments you have to make to position the telescope.

Questions—

1. What do all three telescopes have in common?
2. What are some of the differences between these telescopes?
3. For each telescope, how many times is light reflected?
4. How might this number play a role in the amount of light transmitted through the telescope?
5. How will the number of reflections affect the orientation of the image when it reaches the observer?
6. What are the benefits of different telescope designs?
7. What are the drawbacks?
8. What do the two mounts have in common?
9. What is different between the two mounts?
10. What are the benefits of each mount?