

Two Small Pieces of Glass

Glossary

Aperture

The diameter of the telescope's main optical element, be it a lens or a mirror.

Adaptive Optics

Is a technology used to improve the performance of ground based telescopes by measuring the distortion caused by the atmosphere in real-time and subtracting them out before the light from an object reaches the focal plane of the telescope.

Astronomy

Astronomy is the study of the universe and the celestial bodies that reside in it, including their composition, history, location, and motion.

Astronomer

A scientist who studies the universe and the celestial bodies residing in it, including their composition, history, location, and motion. A scientist who studies celestial objects using visible light is called an optical astronomer while one who studies celestial objects in the radio wavelengths is called a radio astronomer.

Atmospheric distortion

The blurring of an image due to the layer of gases surrounding the surface of Earth. As starlight travels through the atmosphere, pockets of air act like little lenses and bend the light in unpredictable ways. This distortion causes stars to appear to twinkle.

Big Bang-theory

A broadly accepted theory for the origin and evolution of our universe. The theory states that all the matter in our observable universe came into being at a single moment in time as an extremely hot, dense, mixture of subatomic particles and radiation.

Cepheid variables

Cepheid variables, are stars which brighten and dim periodically. This behavior allows them to be used as cosmic yardsticks out to distances of a few tens of millions of light-years.

Cosmic background radiation

Electromagnetic energy filling the universe that is believed to be the radiation remaining from the Big Bang. It is sometimes called the "primal glow." This radiation is strongest in the microwave part of the spectrum but has also been detected at radio and infrared wavelengths. The intensity of the cosmic microwave background from every part of the sky is almost exactly the same.

Chromatic aberration

Visible light is made of different colors. When visible light passes through a glass lens or a prism, it gets dispersed, or split, into its many colors. A lens focuses each color at a different point, causing a fringe of color to appear around bright objects.

Dark matter

Matter that is too dim to be detected by telescopes. Astronomers infer its existence by measuring its gravitational influence. Dark matter makes up most of the total mass of the universe.

Detector

A device used to measure the amount of electromagnetic radiation emitted by celestial objects. Frequently, detectors are used to sense light that is not visible.

Diameter

The distance from one side of a circle to the other measured through the center. For telescopes, the diameter of a lens or mirror is measured from one side to the opposite side, passing through the center.

Doppler effect

The Doppler effect is the apparent shift in the observed frequency of a wave, due to relative motion between the source and the observer.

Double stars

A system of two stars that are gravitationally bound to each other. They orbit each other around a common center. They can also be called binary stars.

Electromagnetic spectrum

The entire range of wavelengths of light. Arranged from longest to shortest wavelength, it includes radio waves, microwaves, infrared, visible, ultraviolet, X-rays, and gamma rays. All electromagnetic waves travel at the same speed in space.

Eyepiece

The lens or lens group closest to the eye in an optical instrument such as a telescope or microscope.

Field of view

The field of view is the area of the sky visible through a telescope.

Focal length

Focal length (shown in red) is the distance between the center of a convex lens or a concave mirror and the focal point of the lens or mirror — the point where parallel rays of light meet, or converge.

Focal point

The focal point of a lens or mirror is the point in space where parallel light rays meet after passing through the lens or bouncing off the mirror.

Galaxy

A collection of stars, gas, and dust bound together by gravity. The smallest galaxies may contain only a few hundred thousand stars, while the largest galaxies have thousands of billions of stars. The Milky Way galaxy contains our solar system.

Lens

A carefully ground or molded piece of glass, plastic, or other transparent material that causes light to bend and either come together or spread apart to form an image.

Light Year

The distance that light can travel in one year. The speed of light is approximately 186,000 miles per second. In one year light travels about 6 trillion miles.

Magnification

Enlargement in the size of an optical image. For telescopes, magnification is not as important as the ability to gather light, which depends on the diameter of the primary lens or mirror.

Milky Way

The Milky Way, a spiral galaxy, is the home of Earth. The Milky Way contains more than 100 billion stars and has a diameter of 100,000 light-years.

Newtonian reflector

A type of reflecting telescope whose eyepiece is located along the side of the telescope. When light enters the telescope, it reflects from the primary mirror to the secondary mirror. The secondary mirror reflects the light at a right angle through the side of the telescope to the eyepiece.

Observatory

A building, group of buildings, or spacecraft specifically designed and fitted with equipment to study celestial objects.

Optics

The science that deals with the properties of light; in this case specifically dealing with the way light changes directions when it is either refracted and dispersed by a lens or reflected from a mirror.

Prism

A prism is usually a triangular-shaped piece of glass used to refract, or bend, light. The shape of the glass causes the light to disperse, or spread out, as it bends, producing a rainbow of colors from the white light.

Reflection

Reflection occurs when light changes direction as a result of "bouncing off" a surface like a mirror.

Reflector (Reflecting telescope)

A type of telescope, also known as a reflecting telescope, that uses one or more polished, curved mirrors to gather light and reflect it to a focal point.

Refraction

Refraction is the bending of light as it passes from one substance to another. The bending is caused by the differences in density between the two substances.

Refractor (Refracting telescope)

A type of telescope, also known as a refracting telescope, that uses a transparent convex lens to gather the light and bend it to a focal point.

Resolve

The ability of a telescope to distinguish objects that are very close to each other as two separate objects.

Resolution (Resolving power)

A measure of the smallest separation at which a telescope can observe two neighboring objects as two separate objects.

Spectrum

The entire range of electromagnetic rays from the longest radio waves to the shortest gamma rays. Arranged from longest to shortest wavelengths, the spectrum of electromagnetic radiation includes radio waves, microwaves, infrared light, visible light, ultraviolet light, X-rays and gamma rays.

Spectroscopy

The study and analysis of the light from a celestial object. A spectroscope, spectrograph, or spectrometer is used to spread white light into a rainbow of colors.

Spherical aberration

Spherical aberration is an optical defect of a lens or mirror caused by its rounded shape. Spherical lenses and mirrors produce a distorted (blurry) image.

Star

A huge ball of gas held together by gravity. The central core of a star is extremely hot and produces energy. Some of this energy is released as visible light, which makes the star glow. Stars come in different sizes, colors, and temperatures. Our Sun, the center of our solar system, is a yellow star of average temperature and size.

Sunspots

A sunspot is a region on the Sun's photosphere that is cooler and darker than the surrounding material. Sunspots often appear in pairs or groups with specific magnetic polarities that indicate electromagnetic origins.

Telescope

An instrument used to observe distant objects by collecting and focusing their electromagnetic radiation. Telescopes are usually designed to collect light in a specific wavelength range. Examples include optical telescopes that observe visible light and radio telescopes that detect radio waves.

Reference (Telescopes From the Ground Up Teacher Page: Lesson Plan)

<http://amazing-space.stsci.edu/resources/explorations/groundup/teacher/lessonplan.php#new>

