

GLOSSARY

ablation	erosion of an object (generally a meteorite) by the friction generated when it passes through Earth's atmosphere
achromatic lens	a compound lens whose elements differ in dispersive indices in order to minimize chromatic aberration
albedo (Bond)	the ratio of the amount of light reflected from a surface to the amount of incident light
albedo (geometric)	the reflectivity of the body at zero phase angle to that of a "Lambert sphere", which reflects light according to a $\cos\theta$ law, where θ is the angle from the surface normal. Venus approximates a Lambert sphere. Airless satellites with bright icy surfaces can have geometric albedos greater than 1.0.
altitude	the angular distance of a celestial body above or below the horizon
aperture stop	the physical aperture in an optical instrument that limits the amount of light passing through the instrument
aphelion	for an object orbiting the Sun, the point in its orbit that is farthest from the Sun
appulse	the very near approach of one celestial body to another as seen by an observer
arcminute	one sixtieth of a degree of angular measure
arcsecond	one sixtieth of an arcminute, or $1/3600$ of a degree
ascending node	in the orbit of a Solar System body, the point where the body crosses the ecliptic from south to north
asteroid	a small rocky body that orbits a star — in the solar system, most asteroids lie between the orbits of Mars and Jupiter
astigmatism	a defect in a mirror or the eye which results in light rays not reaching a common focus and resulting in distorted images
astronomical unit	mean distance between the Earth and the Sun
asynchronous	refers to orbital motion in which the orbital period is not the same as the rotation period of the central body
axis	theoretical straight line through a celestial body, around which it rotates
azimuth	the direction of a celestial body from the north point, measured eastward in the plane of the horizon. Azimuth and altitude, together, specify the position of the body
bandpass filter	a device for suppressing unwanted frequencies without appreciably affecting the desired frequencies
binary star	two stars forming a physically bound pair under their mutual gravitational attraction—the stars move in elliptical orbits about their common centre of mass
black hole	a region of spacetime that cannot be seen by distant observers because light is trapped by a strong gravitational field
candela	the SI base unit of luminous intensity
Cassegrain telescope	a reflecting telescope devised by Cassegrain (c. 1672) in which the light from a concave, paraboloidal primary mirror is reflected by a smaller, convex, hyperboloidal secondary mirror to pass through a hole in the centre of the primary to a focus
cataclysmic variable	a star in which the brightness increases suddenly because of an explosive event
celestial equator	projection of the Earth's equator as a line across the sky (for an observer on the equator, such a line would pass through the zenith)
celestial poles	the two points at which the Earth's axis of rotation, if extended, would intersect the celestial sphere
celestial sphere	in astronomy and navigation, the celestial sphere is an imaginary rotating sphere of "gigantic radius," concentric and coaxial with the Earth; all objects in the sky can be thought of as lying upon the sphere
charge	the fundamental property of a subatomic particle that is the source of its electric field and by which the particle is affected by external electric and magnetic fields

chromatic aberration	introduction of spurious colours by a lens, attenuated by the introduction of corrective elements into a compound lens
conjunction	the configuration in which two bodies have the same apparent celestial longitude or right ascension as viewed from a third body
contrast	the difference in visual properties that makes an object distinguishable from other objects and the background
constellation	a group of celestial bodies (usually stars) that appear to form a pattern in the sky or appear visibly related to each other
coordinates	quantities that provide references for locations in space and time
corona	outermost atmosphere of the Sun
cosmic rays	high-speed particles that reach the Earth from outside the Solar System
culminate	to reach the highest point above an observer's horizon
declination	angular distance above or below the celestial equator—one of the coordinates, with right ascension, that defines the position of a heavenly body on the celestial sphere
deferent	in the Ptolemaic system, the planets are assumed to move in a small circle, called an epicycle, which in turn moves along a larger circle called a deferent
descending node	in the orbit of a Solar System body, the point where the body crosses the ecliptic from north to south
dichotomy	50 percent illuminated; literally split in two
ecliptic	the apparent path that the Sun traces out in the sky during the year, so named because eclipses occur when the full or new Moon is very close to this path of the Sun
elongation	a planet's elongation is the angle between the Sun and the planet, as viewed from Earth
ephemeris	a table of values that gives the positions of astronomical objects in the sky at a given time or times; plural = ephemerides
epicycle	in the Ptolemaic system, the planets are assumed to move in a small circle, called an epicycle (see deferent)
exit pupil	the image of the aperture stop of an optical instrument as formed by all the optical elements behind it
flux	the surface integral of a vector quantity (such as electric field or magnetic field) that passes through a specified surface area; or the amount of a scalar quantity (such as energy or mass) that flows through a specified surface area per unit time
galaxy	vast system of celestial objects, typically consisting of between 10^6 and 10^{12} stars, plus interstellar gas, dust, and possibly as yet unidentified dark matter
Galilean telescope	a refracting telescope having a single lens as its primary image-forming optical element, and a single, concave (diverging) lens as its eyepiece; it has a very narrow field of view, is somewhat limited by chromatic aberration, was the earliest type of telescope (invented c. 1608, in Holland), and was used by Galileo in his epoch-making discoveries of the heavens.
geocentric	with reference to, or pertaining to, the centre of Earth
geodesic	a path or line of shortest distance joining two points in space (or spacetime)
Gregorian calendar	the calendar introduced by Pope Gregory XIII in 1582 to replace the Julian calendar; the calendar now used as the civil calendar in most countries.
heliocentric	a cosmological system in which the Sun is at (or near) the central point
Hertzsprung-Russell diagram	a plot of stellar colour, temperature, or spectral type versus stellar luminosity
illuminance	the luminous flux incident on a surface per unit area; 1 lumen per square metre = 1 lux
inclination	the angle between one plane and another; the (equatorial) inclination of a planet is the angle between the plane of its equator and that of its orbit; the inclination of the orbit of a planet in the Solar System other than Earth is the angle between the plane of that orbit and the ecliptic
Lagrangian points	five points in the orbital plane of two massive objects in orbits around a common centre of gravity, where a third body of negligible mass can remain in equilibrium

latitude	angular position of a celestial object on the celestial sphere measured north or south of the ecliptic along the great circle passing through the poles of the ecliptic and the celestial object
light-year	distance travelled at the speed of light during one Earth year: 9.46 million million km
longitude	angular position of a celestial object on the celestial sphere measured eastward along the ecliptic from the vernal equinox to the great circle passing through the poles of the ecliptic and the celestial object
lumen	the SI unit of luminous flux, equal to the luminous flux emitted by a point source of one candela in a solid angle of one steradian
lunation	the period of time between two successive new Moons
Lyman-alpha line	the characteristic spectral line of atomic hydrogen associated with its two lowest energy states
magnitude	a logarithmic brightness scale for astronomical objects; the measured brightness of a celestial body; dim objects have magnitudes of high numbers, bright objects have magnitudes of low or (sometimes) negative numbers
main sequence	a band that runs from top left to bottom right on the Hertzsprung-Russell diagram representing the majority of stars
Maksutov telescope	similar to a Cassegrain telescope except both the concave primary and convex secondary mirrors have spherical surfaces and are preceded by a deeply-curved meniscus glass lens that corrects the spherical aberration introduced by the two mirrors; invented independently in 1941 by Maksutov in Russia and Bouwers in Holland, and usually limited to apertures of less than 20 cm
metallicity	a term used by astronomers that refers to all chemical elements other than hydrogen and helium
nebula	indistinct, non-terrestrial objects visible in the night sky; “bright” nebulae glow with light emitted by the gas of which they are composed (“emission” nebulae) or by starlight reflected from dust (“reflection” nebulae) or both; “dark” nebulae consist of clouds of gas and dust that are not so illuminated; “planetary” nebulae are shells of gas ejected by stars; spiral nebulae are galaxies
Newtonian telescope	a reflecting telescope devised by Sir Isaac Newton (in 1668) that has a concave, paraboloidal primary mirror as its primary image-forming optical element and a smaller, plane, secondary mirror at 45° to deflect the light from the primary to a focus outside the tube near the top of the telescope
nutation	a small, irregular oscillation in the precessional motion of Earth’s rotational axis, caused primarily by lunar perturbations
occultation	the cut-off of the light from a star caused by its passage behind another celestial body; strictly speaking, a solar “eclipse” is a solar occultation
opposition	when Earth comes directly between a planet and the Sun
osculating elements	a set of parameters that specifies the instantaneous position and velocity of a celestial body in its perturbed orbit
parallax (stellar)	half the apparent angular displacement of a star when observed from opposite sides of Earth’s orbit
penumbra	the portion of a shadow within which only part of the light from an extended light source can be observed
periastron	the point in the orbit of one component of a binary star system where it is nearest the other component
perihelion	for an object orbiting the Sun, the point in its orbit that is nearest the Sun
precession (of Earth)	the slow (once per 26000 years) conical motion of Earth’s rotation axis, caused by gravitational torques exerted by the Moon and Sun on Earth’s equatorial bulge
prograde	in a forward direction; in astronomy, an eastward direction
quadrature	elongation of a planet when it makes a 90° angle with the Sun as seen from Earth
quasi-conjunction	said of two planets that, as viewed from Earth, approach near one another but without attaining the same right ascension

radial velocity	velocity along the line of sight toward (negative) or away from (positive) the observer
radiant	the point in the sky from which a meteor shower appears to emanate
redshift	the shift of spectral lines toward longer wavelengths, caused by motion away from the observer, motion transverse to the observer (time dilation), and/or the gravitation field of the source
refracting telescope	a telescope having a lens (usually composed of two or three lens elements) as its primary image-forming optical element and, for visual use, an eyepiece near the focus at its lower end
refraction	the change in direction of travel (bending) of a light ray as it passes obliquely through the atmosphere; in the case of a lens, any ray as it passes obliquely from one medium into another of greater or lesser refractive index
relativity	the theory of how motion and gravity affect the properties of time and space
resonance (orbital)	when two orbiting bodies exert a regular, periodic gravitational influence on each other
retrograde	in a backwards direction; in astronomy, an east-to-west direction
right ascension	angular distance on the celestial sphere measured eastward along the celestial equator from the vernal equinox to the great circle passing through the celestial poles and the object
Ritchey-Chrétien telescope	a common form of professional telescope, similar to a Cassegrain telescope except that both the concave primary mirror and the convex secondary mirror have hyperboloidal surfaces resulting in a moderately large field of view free of third-order coma and spherical aberration; invented c. 1912 by George Ritchey and Henri Chrétien
Roche lobe	the Roche lobe is the region of space around a star within which orbiting material is gravitationally bound to that star
Schmidt-Cassegrain telescope	since c. 1970, a common type of telescope used by amateur astronomers, similar to a Cassegrain telescope except that the primary mirror has a spherical surface and is preceded by a thin glass corrector plate (a specialized weak lens) which corrects the spherical aberration that would otherwise be introduced by the primary mirror
Seyfert galaxy	a type of spiral galaxy first discovered by Karl Seyfert in the 1940s; the central region of a Seyfert galaxy is distinguished by powerful radiation, much of it focused into narrow frequencies
SI	abbreviation taken from <i>Système international d'unités</i> —the modern form of the metric system
sidereal	relating to the period of time based on the apparent rotation of the stars, and therefore equivalent to the rotation of the body from which the observation is made
spacetime	the three physical dimensions of space are combined with time, treated as a fourth dimension, to constitute the spacetime continuum that is used as the fundamental framework of the theory of relativity
spectrum	the breakdown of light into a rainbow of colours; a good stellar spectrum reveals a star's spectral type, radial velocity (from the spectrum's Doppler shift), and metallicity
steradian	a unit of solid (three-dimensional) angular measure; one steradian is equal to the angle subtended at the centre of a sphere by an area of surface equal to the square of the radius
synchronous orbit	the orbital period of a satellite is the same as that of the rotation period of the central body; for example, ring particles orbiting near the outer edge of Saturn's "B" ring, or stationary satellites orbiting Earth
synchronous rotation	the rotation period of a satellite is the same as its orbital period; for example, Earth's Moon
synodic period	for an Earth-based observer, the time interval for a celestial body to return to its same configuration relative to the Sun; such as between successive oppositions or conjunctions for a planet, or the same phase for the Moon
umbra	the portion of a shadow cone in which none of the light from an extended light source (ignoring refraction) can be observed